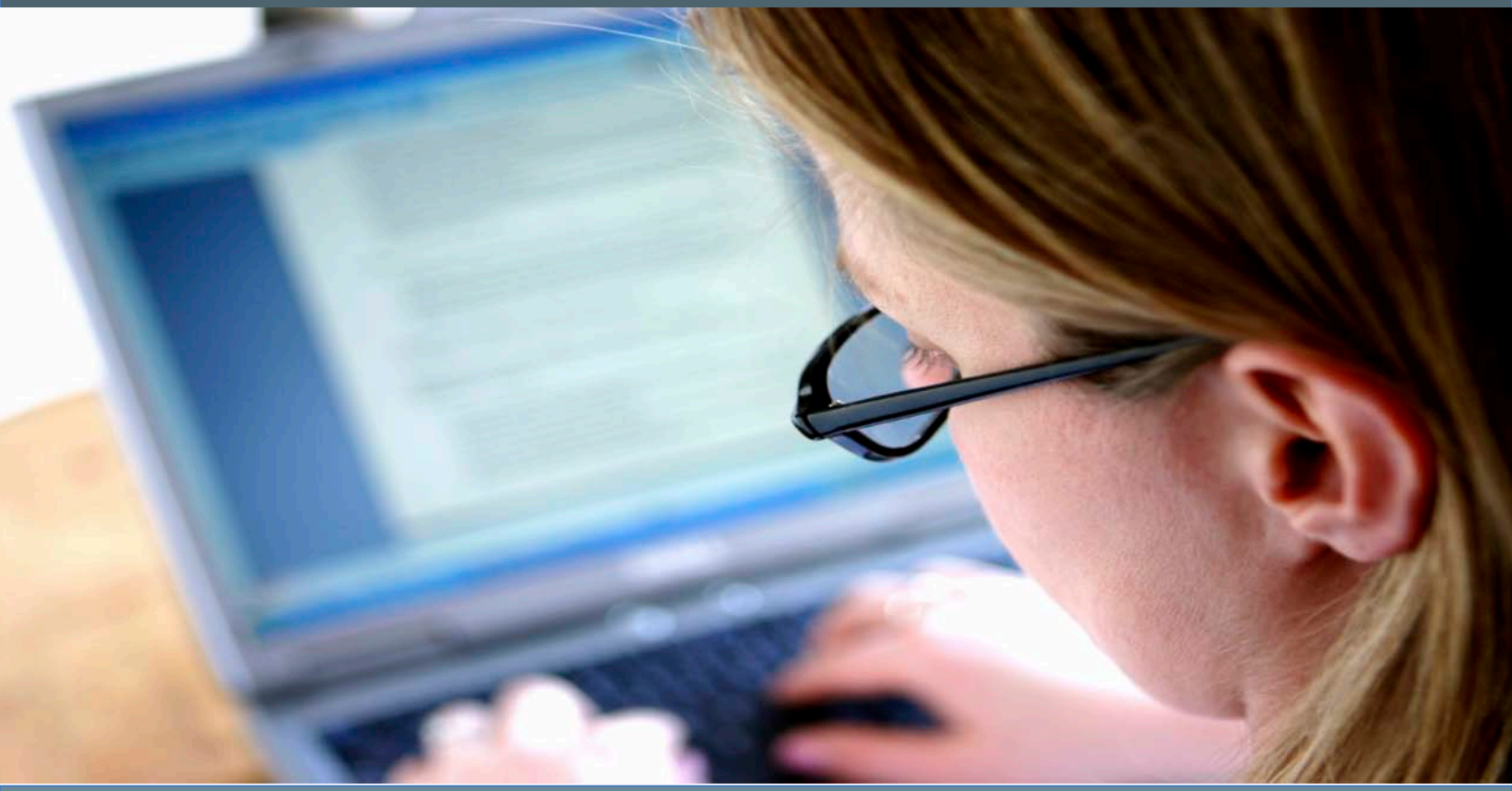
REPORT

The Research Alliance for New York City Schools

Usage Patterns and Perceptions of the Achievement Reporting and Innovation System (ARIS)



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EXECUTIVE SUMMARY

The federal government, states, school districts and private foundations are investing hundreds of millions of dollars in educational data management systems. The hope for these investments is that providing better information to teachers and administrators, particularly student performance data, will support school-wide planning, inform classroom practice and ultimately boost student achievement. Like many previous education reform trends, however, the investment in building these sophisticated data systems has yet to be matched by a commensurate investment in research on their implementation or effectiveness. As a result, little is known about how much and in what ways these systems are actually used, what conditions optimize their use, and, in the end, whether they are making a difference.

With support from the Spencer Foundation, the Research Alliance for New York City Schools is undertaking a study of the country's largest and arguably most ambitious school data system, the New York City Department of Education's Achievement Reporting and Innovation System (ARIS). ARIS provides teachers, administrators, school support staff, and parents with access to a multitude of student data and education resources. It was rolled out in 2008 as part of the City's larger education reform agenda—a broad effort to make schools more data-driven, more accountable for results, and, ultimately, more effective for students.

This report offers the first systematic examination of ARIS's actual usage data and sheds light on the extent to which ARIS is achieving its goals. Based on our analysis of a full year of ARIS "clickstream" data, as well as surveys, interviews and focus groups, the study addresses the following questions

- To what extent and in what ways do the City's educators use ARIS?
- What do educators see as the strengths and limitations of ARIS?
- What enhancements and supports do educators believe would make the system more useful?

The remainder of this summary addresses each of these questions in turn. A concluding section offers further insight into whether ARIS is accomplishing the broad and multi-faceted goals for which is was designed—particularly, guiding school planning and accountability, supporting the school-wide "inquiry process" and empowering teachers with data and resources to inform their practice.

To What Extent and in What Ways do Educators Use ARIS?

Clickstream data are generated every time someone logs on to ARIS or navigates to a new page. To determine actual ARIS usage, we analyzed more than 24 million clickstream records, from nearly 1.5 million distinct sessions, which were generated between July 1, 2010 and June 30, 2011. We found that:

- **Most of the City's educators used ARIS at least once during the 2010-2011 school year, usually for brief periods of time.**

More than 69,000 educators logged on to ARIS at least once during the 2010-2011 school year. This represents 73 percent of all school-based administrators and teachers, including 94 percent of principals, 84 percent of assistant principals, 67 percent of teachers, and 60 percent of other administrative staff. The average user logged on to the system 21 times during the year, for just under five minutes per session.

- **The vast majority of ARIS use involved accessing basic student data, with comparatively less time spent using the system's analytic, knowledge management and virtual collaboration tools.**

Exhibit ES-1 shows that ARIS users spent a combined total of more than 90,000 hours (82 percent all the time spent on the system) viewing the various forms of data available on students (the ARIS Data areas), including biographical and enrollment information, attendance data, periodic assessment results, state test results and transcripts. Most of this "Data" time was spent with Individual Student Profiles or with information organized at the classroom level (referred to as "Views"). Much less time was spent with system's advanced reporting features ("Reports") or what is known as ARIS Connect, which allows teachers to search for instructional tools and share resources and information with one another.

- **A subset of educators used ARIS much more heavily; this group represented 28 percent of users, but accounted for more than 80 percent of all of the time on the system.**

The second column in Exhibit ES-1 shows the activity of the nearly 20,000 teachers and administrators who made the most intensive use of ARIS during the 2010-2011 school year. While these individuals represented just 28 percent of all ARIS users, they accounted for nearly three quarters of all ARIS sessions. And at more than four and a half hours of usage during the year, these heavy users accounted for more than 80 percent of all time spent on the system. By contrast, the remaining ARIS users each spent an average of less than 25 minutes on the system, and more than half of these were logged on for less than five minutes over the course of the year.

Exhibit ES-1
ARIS Usage During the 2010-2011 School Year

System Areas and Usage Measures	All Users	Heavy Users	Moderate Users	Light Users
Total ARIS Usage				
Total hours	111,510	91,967	17,710	1,833
Minutes per user	96.7	283.3	43.7	4.3
ARIS Data Areas				
Total hours	90,184	74,653	14,084	1,447
Minutes per user	78.2	230.0	34.8	3.4
Individual Student Profiles				
Total hours	29,700	26,111	3,411	179
Minutes per user	25.8	80.4	8.4	0.4
Views				
Total hours	38,315	30,772	6,869	674
Minutes per user	33.2	94.8	17.0	1.6
Data Reports				
Total hours	5,891	4,659	1,088	143
Minutes per user	5.1	14.4	2.7	0.3
System Navigation				
Total hours	16,277	13,110	2,716	451
Minutes per user	14.1	40.4	6.7	1.1
ARIS Connect Areas				
Total hours	21,326	17,314	3,626	386
Minutes per user	18.5	53.3	9.0	0.9
Number of Users	69,190	19,475	24,294	25,421

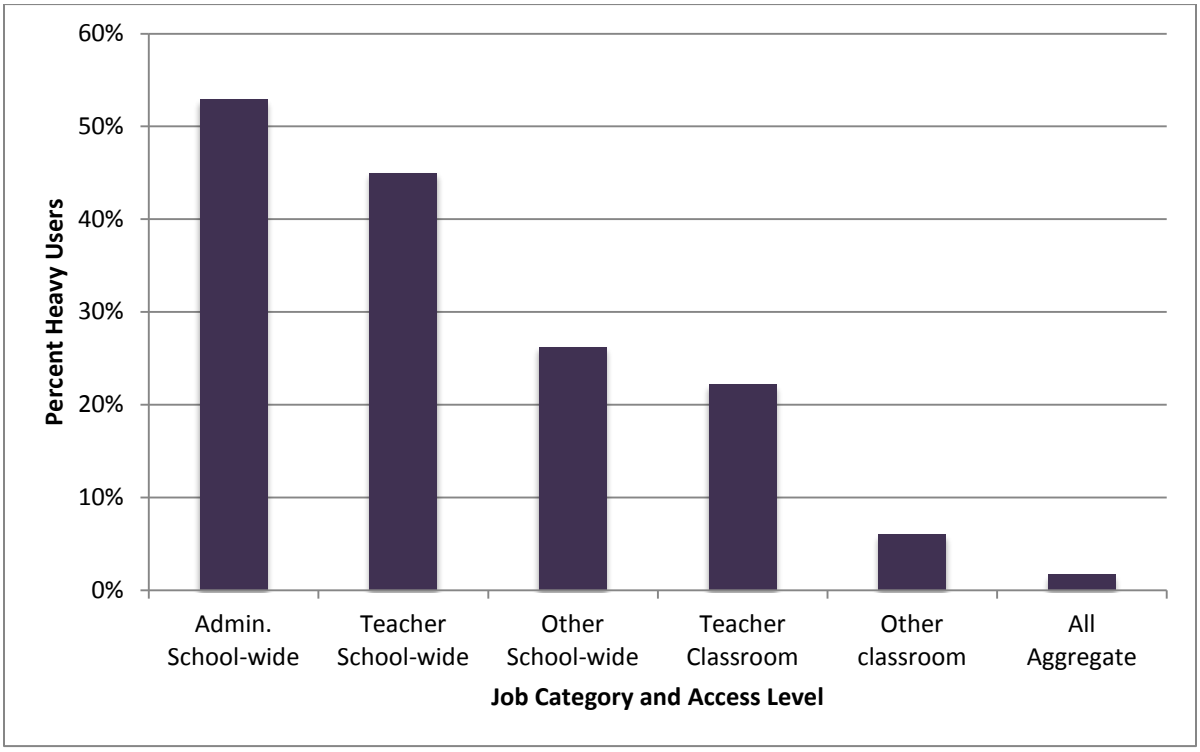
Source: Research Alliance calculations from ARIS Usage data provided by the New York City Department of Education.
Notes: "Heavy" users accumulated a minimum of 90 minutes of ARIS usage during the year. "Moderate" users accumulate between 15 and 90 minutes, and "Light" users accumulated fewer than 15 minutes during the year.

The type of information heavy users accessed in ARIS did not vary significantly from that of light and moderate user. The heavy users did not use either the Reports function or the Connect feature disproportionately more than the other types of users. This suggests that while the heavy users were on ARIS more than other users, they were not generally engaging in comparatively more complex uses of the system.

- **The heaviest ARIS users were predominantly administrators and teachers who were given access to school-wide (versus individual class) information.**

Educators are offered two levels of access to information in ARIS. Administrators and some teachers are given access to information on all students in their school. Other teachers are only given access to information on students in their classes. Exhibit ES-2 shows that school administrators and teachers with school-wide access were the heaviest ARIS users. These educators logged on to the system an average of 59 times during the year, accumulating nearly five and a half hours of usage each. Notably, 94 percent of all New York City schools had at least one heavy ARIS user with access to school-wide information.

Exhibit ES-2
Percent of Educators Who Were Heavy ARIS Users by Job Category and Level of Access



Source: Research Alliance calculations from ARIS usage data provided by the New York City Department of Education.
Notes: "Heavy" users accumulated a minimum of 90 minutes of ARIS usage during the year. The "Other" job category includes counselors, administrative assistants, and support staff. Users with school-wide access can view information for all students in a school. Users with only classroom access can view information only for students enrolled in a particular class. All users with just aggregate access can view only data summarized at the school level.

By contrast, heavy classroom-based usage among teachers was much less prevalent. Teachers with access only to information about students in their classes logged on to ARIS an average of 15 times during the year, accumulating just over 60 minutes of total time on the

system. None of the City's schools had a majority of its teachers making heavy classroom-based use of ARIS, and 26 percent of schools had six or more teachers who were heavy classroom-based users.

What do Educators See as the Strengths and Limitations of ARIS?

To examine educators' perceptions of ARIS, we surveyed 627 teachers from 23 middle schools, which were broadly representative of the City's nearly 250 grade 6-8 schools. In 10 of these schools, we also conducted in-person interviews with administrators and data specialists and focus groups with teachers.

Educators highlighted a number of ways that ARIS has been useful. For most of the teachers we surveyed, ARIS has become the primary source for key student data, including state test results, periodic assessment scores, attendance records, student biographic information, and current courses and grades. This is significant, given that prior to ARIS, teachers had to track down information on their students from a variety of electronic and paper sources (and in some cases, did not have direct access to the data and had to request it from an administrator). Teachers found the data in ARIS particularly useful in the beginning of the year, as it provided a "blueprint" of the new students entering their classrooms.

ARIS has become a convenient "single stop" for educators seeking student data, especially at the whole-school level. The administrators we interviewed explained how they used ARIS for a variety of school-wide planning and decision-making. Many reported using ARIS data to target professional development, for example, or to coordinate after-school supports.

Our surveys and fieldwork also suggest that early technology issues, such as sluggishness in the system, have largely been resolved. But educators cited other barriers that continue to undermine ARIS use. Many saw inadequate training as a significant obstacle, for instance. Well over 70 percent of those surveyed felt they needed more training to use the system effectively. Teachers also reported that the data available in ARIS, which is generally loaded into the system at the beginning of the year and does not change, is of limited value for classroom instruction. Finally, educators reported that ARIS's more complex analytic and knowledge management functions are often difficult to use and are not particularly relevant for their day-to-day work.

What Enhancements and Supports do Educators Believe Would Make the System More Useful?

Our surveys, focus groups and interviews pointed to several potential strategies to overcome the perceived limitations of ARIS and make the system more useful. Not surprisingly, these include improving and expanding ARIS's content. The educators we spoke with wanted better and different kinds of data in ARIS, including more regular, real-time assessment data that could be used to inform classroom instruction, as well as non-academic information, such as updates on student behavior, detailed information from Individual Education Plans (for students

with special needs) and more information about students' home lives. Teachers also said they would appreciate the opportunity to input data, rather than simply accessing it from ARIS.

Another important area for improvement is training and support. Many educators would like additional training, including sessions that are differentiated to meet the needs of users with varying levels of experience and sessions that are much more hands-on. Some educators also called for more dedicated time to learn about and use the system.

Conclusion

Findings from the analysis of ARIS usage data and educators' perceptions of the system provide a mixed assessment of whether ARIS has achieved its ambitious and multi-faceted goals.

As a tool for aggregating data from disparate systems, improving access to information and creating a convenient one-stop resource for educators, especially for school-wide planning, ARIS has been successful. Most educators used the system in some way during the 2010-2011 school year. How much time they spent on ARIS varied greatly, and the heavier users were those whose roles extend beyond the classroom and into larger, school-wide planning. This seems to be largely a function of the kind of information available in ARIS. Assessment data, grades, attendance rates, and credit accumulation data are useful for administrators, data specialists, coaches and inquiry team members, who need to understand and track broad trends in student performance. For school-wide planning and for monitoring a school's progress within the City's accountability system, ARIS gets high marks.

As a source of support for the collaborative school inquiry process—which brings teachers together to review student data, identify learning challenges and develop strategies to address those challenges—ARIS has been partially successful, but underutilized. Those with school-wide roles are using the system heavily. In focus groups and interviews, educators reported that they see ARIS as a valuable tool for the inquiry process. At the same time, the more complex analytic and knowledge management functions—housed in the Reports and ARIS Connect areas—are used much less frequently than the system's basic data tools. Some educators told us that, rather than wrestling with Reports, they often download data from ARIS and then use other resources (e.g., Excel) to manipulate and present it to colleagues. And many teachers were skeptical about the utility of ARIS Connect for sharing knowledge and supporting their work.

Lastly, the findings indicate that ARIS's greatest limitations lie in its use by teachers to inform their instructional practice. Teachers noted both a lack of training in sophisticated uses of the system and a lack of time to engage with ARIS's virtual learning communities and instructional resources. But the biggest issue may be the largely static nature of ARIS's data. To help teachers adjust their lesson plans on a daily or weekly basis or to tailor their instruction to

meet individual student needs, more and different kinds of information would have to be added to the system.

Recommendations and Next Steps

Looking forward, to the next generation of school data systems that are currently in development in New York and around the country, the ARIS experience suggests a number of valuable lessons. Clearly, the data that a system is designed to house should align with its stated goals (e.g., real-time assessment data to inform classroom instruction). In addition, developers should think carefully about the utility of advanced analytical and "community" functions, like ARIS Reports and Connect. At the very least, these features need to be tested under real-world conditions, to ensure that they meet educators' needs and make sense in the context of their busy work lives. It is possible that a less top-down—more "crowd-sourced"—approach to developing these tools, in which educators are able to request or even create ARIS "apps" to support their work, would help make them more effective.

While the first year of this study has painted a rich picture of ARIS use and educators' perceptions of the system, there are still a number of important questions about ARIS that need to be answered. First, if, as our findings indicate, ARIS appears to be best suited as a tool for school-wide planning (as opposed to classroom instruction), what does this school-level usage look like? It would be helpful to examine in much more depth how administrators, inquiry team members and data specialists are using the system to guide organizational development and improvement. Second, are there schools where ARIS *is* being used by teachers to guide classroom instruction? Our study shows that this is not the norm, but it is possible that some schools have figured out how to make ARIS more relevant for day-to-day instruction. If so, their practices, including their approach to training, deserve a closer look. Finally, of course, there is the question of whether ARIS use is associated with improved student achievement. In the second year of our study, we hope to examine year-to-year changes in ARIS use and whether those changes are related to changes in achievement—that is, did schools that increased their use of ARIS also see improved test scores?

All of these questions are important for the design and rollout of future data systems. Understanding where ARIS has met or exceeded expectations, and where it has fallen short—and building knowledge, more broadly, about how people use data in schools—will surely enhance the effectiveness of future efforts.

I. INTRODUCTION

Over the past 15 years, school districts across the country have sought more and better ways to use data to improve their results. This push has led to the investment of millions of dollars in data management systems, in the hopes that providing better information to teachers and administrators, particularly student performance data, would support school-wide planning, inform classroom practice and ultimately boost student achievement (e.g., Wayman et al., 2007; Wayman et al., 2012; Means et al., 2009; and Supovitz & Klein, 2003). The effort to make schools more data-driven has been strongly supported by the U.S. Department of Education, which emphasizes longitudinal data systems in many of its grant programs, and by private funders like the Gates Foundation, which has helped numerous school districts expand their data systems, most recently through its Shared Learning Initiative (Phillips, 2011).

Like many previous education reform trends, the investment in building these sophisticated data systems has yet to be matched by a commensurate investment in research on their implementation or their effectiveness at improving teaching and learning. As a result, we know very little about how much and in what ways these systems are actually used, what conditions allow for their effective use, and, in the end, whether they are making a difference.[i]

This paper presents the results from the first year of a two-year study of the country's largest and arguably most ambitious school data system, the New York City Department of Education's Achievement Reporting and Innovation System (ARIS). ARIS provides teachers, administrators, school support staff, and parents with access to a multitude of student data and education resources. It was rolled out in 2008 as part of the City's larger education reform agenda—a broad effort to make schools more data-driven, more accountable for results and more effective for students.

Our study addresses three overarching questions about ARIS: 1) To what extent and in what ways do the City's educators use ARIS? 2) What do educators see as the strengths and limitations of ARIS? And 3) what enhancements and supports do educators believe would make the system more useful?

Past examinations of ARIS have drawn primarily on surveys of small samples of users, with decidedly mixed results. The $80 million system has generated its share of criticism, including a 2012 report by the Comptroller of New York City, which concluded that "many educators are not using the ARIS system" as intended (Liu & Kim, 2012). But, in reality, these studies have provided only a superficial look at how and how much ARIS was being used. In contrast, our study offers an in-depth examination of ARIS's patterns of use and of educators' perceptions of the system. By analyzing a full year of clickstream data—some 24 million records—we were able to clearly assess how much ARIS was being used, when it was used, and which tools were used most (and least) often. We also administered surveys and conducted

interviews and focus groups to learn about teachers' and administrators' experiences with ARIS, including what changes might make the system more useful to them.

This study is, in fact, one of only a few efforts to understand, empirically, whether and how much teachers and other educators use a student data system. The results to date suggest important lessons and insights that should inform the ongoing development of these systems around the country. Here in New York City, for example, it is likely that ARIS will be replaced by a new statewide data system in 2013. Supported by a Race to the Top grant from the federal Department of Education, the new state system is expected to incorporate many of ARIS's key features. And New York is part of a much larger national trend, spurred in part by the Race to the Top program, which explicitly advocates for the creation of more "robust data systems to track student achievement and teacher effectiveness" (Duncan, 2009). Indeed, many other states and cities are developing systems that are similar to ARIS.

For these "next generation" school data systems to succeed, it is imperative that their developers take account of what has worked well about ARIS, and what has not. As we discuss in more detail below, the results of this study's first year provide a rich picture of how much and in what ways ARIS is being used in New York City schools. The paper begins with an overview of ARIS—its original goals and main components—as well as a summary of previous examinations of its use. Chapter III describes the data sources, data collection strategies and analyses that we employed, as well as the strengths and limitations of our approach. Chapters IV and V present our findings about ARIS usage and educators' perceptions of ARIS, respectively. We conclude with a discussion of the study's implications for the development of ARIS and other, similar data systems, as well as future research on this topic.

II. ARIS Components and Background

ARIS is an innovative tool that brings together an array of student information and instructional resources for New York City's teachers and administrators. Launched in 2008, ARIS was conceived as a core resource that would support larger reform efforts taking place across the City's public schools. To assess how successful ARIS has been, it is important to understand the system's major components and what they were designed to accomplish. This chapter describes ARIS's original goals and main features. It also summarizes the results of past examinations of ARIS and explains how this study expands on that early work.

What Were the Goals for ARIS?

ARIS was conceived and developed as a central part of the Children First reforms, which were implemented under the administration of Mayor Michael Bloomberg and Chancellor Joel Klein beginning in 2002. Designed to better assess and ultimately improve the quality of the City's schools, the reforms were accompanied by several new measures of school performance and functioning, including: progress reports;[ii] surveys of parents, teachers and students to elicit information about the "learning environment" in schools; and School Quality Reviews—regular observations of schools conducted by experienced educators who work in the City's school system. Together, it was hoped, these sources of information would promote more data-driven or data-informed decision-making and improve accountability—at the system, school and classroom level.

ARIS was expected to play an essential role in the reform effort, supporting its goals in several important ways. For one thing, ARIS was designed to offer parents direct access to information about their children's attendance, achievement and progress. Because this study focuses on educator use of ARIS, however, we did not examine this aspect of the system. Rather, we considered three other areas where ARIS was expected to have an impact:

Providing data for school-wide planning and monitoring accountability.

ARIS compiles information for administrators and other staff with school-wide roles, to help them plan initiatives that support school improvement and strong classroom instruction. For example, ARIS provides principals and department heads with access to information about students' prior achievement and grades, which they can use to group students and assign courses. A principal might also use the information in ARIS to plan professional development for teachers, targeting areas where students are struggling. Data on attendance could be used to address the issue of truancy, as needed.

ARIS also provides tools that leaders can use to understand and track their school's status and progress within city and state accountability systems. For example, high school principals, who are held accountable for the yearly graduation rate of their schools, can use ARIS to track and monitor cohorts of graduating students, allowing them to anticipate their school's graduation

rate. In this way, ARIS enables school administrators to see the same information the central office sees (information that is used to assess administrators' performance).

Some of this data was, theoretically, available to administrators before the introduction of ARIS, but it was stored in a variety of different places and formats. ARIS's developers hoped that by compiling all of the data in one central location, and presenting it in a clearer and more coherent way, the new system could help administrators monitor their school's progress and plan more effectively.

Supporting the school-wide inquiry process.

The Children First reforms introduced the concept of "inquiry" to the city's schools—a process by which educators come together to investigate and explore the challenges of struggling students. After piloting the approach in a subset of schools in 2007, the DOE expanded it to all schools throughout the City, with the expectation that most teachers and staff would be involved. According to the DOE:

> *Collaborative inquiry is a sustained process of investigation and action that empowers teachers to focus on what they are teaching, how they are teaching it, and how well students are learning. This leads to improved student achievement and also supports efforts to close the achievement gap.*[iii]

In practice, inquiry teams are groups of teachers and administrators who are tasked to conduct a deep-dive investigation around a group of "inquiry students" in their building and "identify and successfully address the learning needs of students in their charge" (Robinson 2010 p. 3). During the year, members of the inquiry team review student work, examine curricular materials and observe classroom interactions to "identify weakness in current practice." They then make recommendations for instructional strategies, implement them and monitor their effectiveness. The process starts anew the following year (see also Talbert, 2011, p. 140).

One can easily see how ARIS has been expected to support and enable this work. The inquiry cycle starts with an examination of the kind of student data housed in ARIS. The system can be used to select students for closer attention and to run reports that help identify or validate trends in attendance or student performance. Once the key areas of need have been pinpointed, inquiry team members can also use ARIS to find resources, such as lesson plans and standards-aligned curricular materials that other inquiry teams have shared. In fact, in one document that we obtained from the DOE, the use of ARIS for the inquiry process was mapped out in exactly this way (NYCDOE not dated; See also Tucker 2010 who highlights how ARIS is used in the inquiry cycle).

In short, ARIS and the inquiry process have evolved together. The data housed in ARIS and the system's grouping, reporting and resource-sharing functions have been seen, from the outset, as essential tools to facilitate the work of the school inquiry teams.

Empowering teachers with data to inform their practice.

Prior to ARIS, teachers had to track down information on their students from a variety of electronic and paper sources. In some cases, teachers did not have direct access to the systems that housed the data and had to request the information from an administrator. ARIS changed all of this by putting data directly into the hands of teachers, with the hope that it would "empower educators to improve student outcomes" and "transform information into improved classroom practice" (NYCDOE 2009). The system was designed to provide teachers with data about their students' background and performance that would allow them to better tailor instruction to meet each student's needs. As the DOE argued, ARIS would help:

> *…principals and teachers to continue to transform schools from a culture of uniformity, where every student gets the same instruction even if he or she already knows the material, to a culture of customization, where teachers use the best methods and thinking available throughout the City to tailor instruction to the learning needs of each individual student* (NYCDOE, 2008-2009, p. 17).

The goals for ARIS were, thus, ambitious. The system would apply the concept of "knowledge management"—employed by many businesses to identify, capture and disseminate innovative ideas or practices and use it to foster stronger classroom instruction.[iv] ARIS was seen as more than just a way to aggregate important student data in one place; it was viewed as a tool that would facilitate a whole-scale change in the culture of schools and the way teachers and other educators understand their role in educating students. ARIS would not just help teachers access data about their students; it would inspire them to look deeper into the challenges of student learning and spur them to develop more successful methods for meeting their students' needs.

The next section describes the specific components of ARIS, which were designed to deliver on these ambitious goals.

What Are the Components of ARIS?

Much of the data in ARIS is fed in from other systems, including the Automate the Schools (ATS) system (for state assessment, biographic, and administrative information), the Student Transcript and Academic Recording System (STARS) (for schedules and transcripts in middle and high schools), and many of the city's periodic assessment systems.[v] The New York City Department of Education's (DOE's) human resources systems also feed into ARIS, to provide information about teachers and other staff.

All full-time teachers and school administrators and some part-time teachers have access to ARIS, as do some staff working in the DOE's central offices. School administrators have access to all of the data on students in their school, while teachers generally have access only to the data on students enrolled in their classes. If teachers perform certain school-wide functions,

such as subject-specific coaches, data specialists or inquiry team members, they too get access to information about all the students in their school. Parents of children who attend a New York City public school can use ARIS to access assessment, attendance and other data about their child.

ARIS has three main areas—Parent Link, ARIS Data and ARIS Connect. ***ARIS Parent Link*** provides basic information to the parents of New York City school children in grades K-12 about their child's status and progress. Parents can view their child's attendance records, state and periodic test results, and transcripts (for middle and high school students). Parent Link, which is translated into 10 different languages, also includes basic tutorials on the meaning and significance of different assessments and provides links to various reports published by the DOE and the state Department of Education about schools' performance and accountability status. As noted above, given our focus on educator use of ARIS, the results we present in this paper do not include ARIS Parent Link. Our analysis, instead, targets the two other core components of the system, ARIS Data and ARIS Connect.

ARIS Data is the central and, as we will see later in this report, the most used part of the system. It compiles information about individual students from a variety of sources, including biographical and enrollment information, periodic assessments, state test results and transcripts, and allows users to retrieve and analyze the data in a variety of ways. ARIS Data has two main subsections:

Ways to Access Student Information in the *ARIS Data* Area

My Students > Views In the Views section, teachers can see a complete list of their students, selecting the information they wish to view about each one, such as their assessment scores or some other biographic or administrative data. Teachers can also form groups of students—for example, all the ELL students in their class—and follow their progress over time.

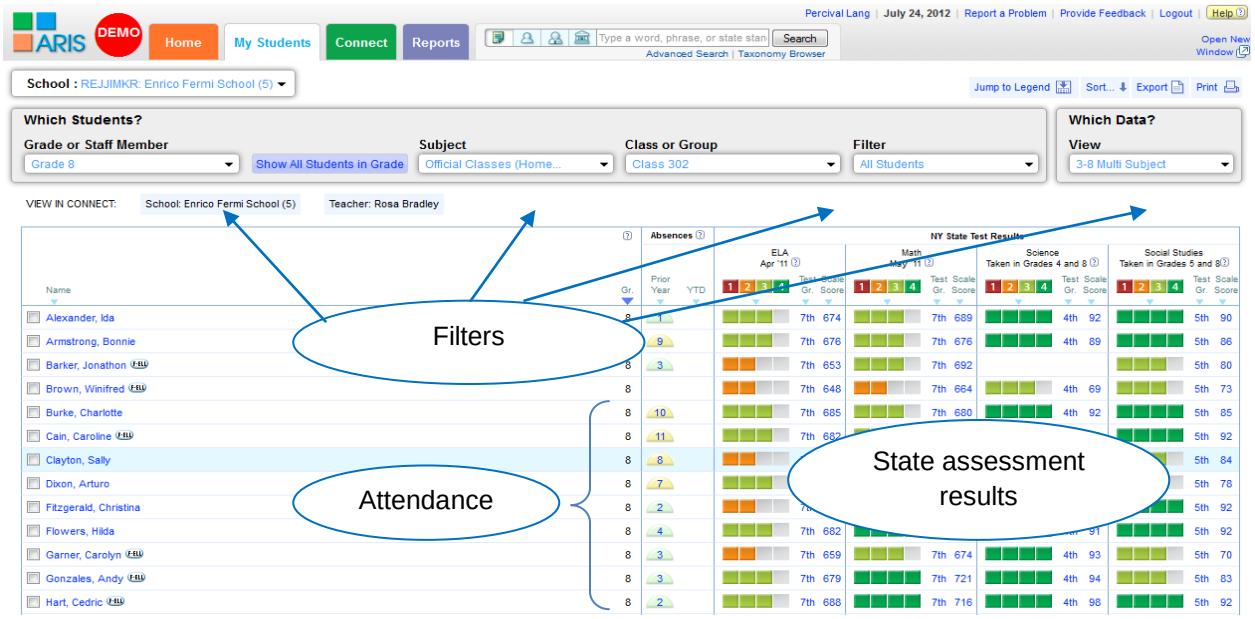
A principal or other educator with school-wide access can see the same information teachers see, or they can view this information summarized at the classroom level. For example, rather than seeing test scores for individual students, a principal may see the average test score results for an entire class or even for all classes of a specific grade. In this way, a principal can monitor the progress of their teachers. Similarly, administrators working in central offices can use Views to see and compare aggregate results for entire schools.

My Students > Student Profiles By clicking on a student's name in the Views section, a user can "drill down" to access a nearly complete administrative record, including details about the student's attendance, assessment results, biographic information, parent or guardian contact information, the student's enrollment history and transcript.

- ***My Students,*** where users can access information about a group of students (such as a teacher's entire class)—via the *Views* area—or about a specific student—via individual *Student Profiles*. (See the textbox on the previous page for more information about Views and Student Profiles. Figure 1 below displays a screenshot from the Views area.)

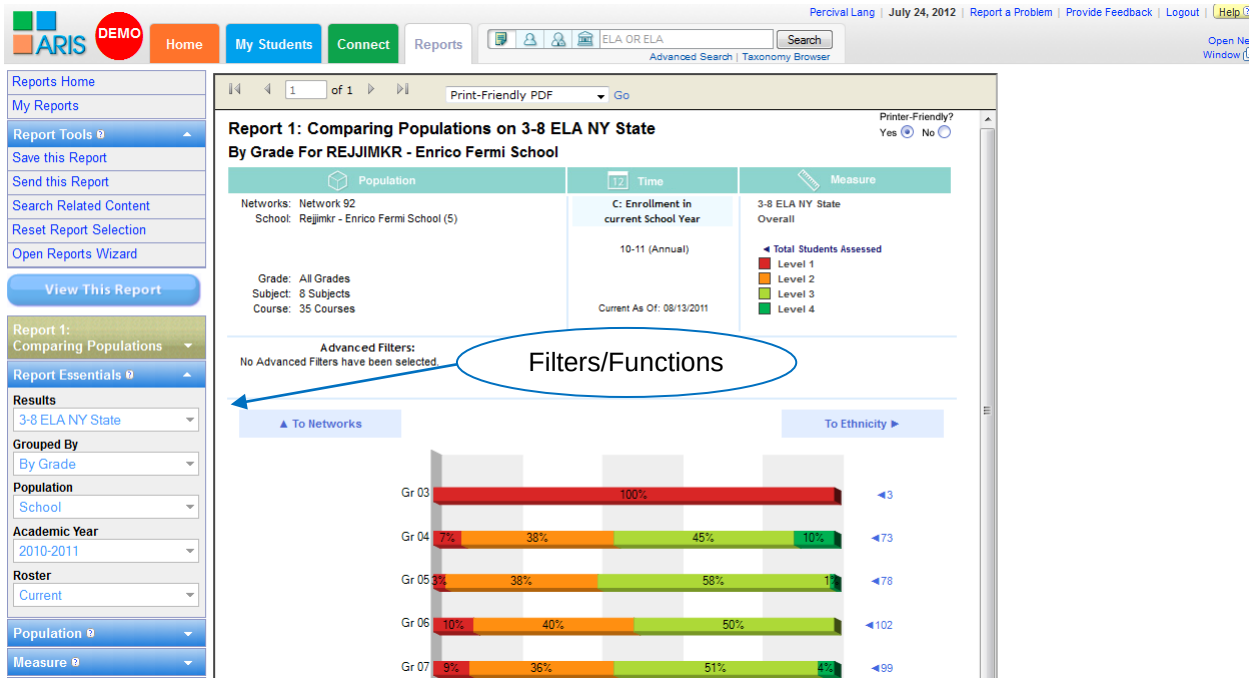
- ***Reports***, which provide tools to view and analyze data about students' backgrounds and performance in a range of formats (see Figure 2 on page 12). For example, a teacher might compare a subgroup of her own students, such as English language learners (ELLs), with other groups of students in her building or citywide. There are also functions that allow users to examine correlations, such as between test scores and attendance rates. The user can either generate premade "Quickstart" reports or customize a report by selecting specific data and parameters. Over the past year, the DOE has tried to simplify the Reports function by introducing a "Reports Wizard" that takes users, step by step, through the process of customizing their own reports. Finally, within the Reports function, users can also access the three main performance and accountability reports for their school: the Progress Report, Quality Review results, and the School Survey.

Figure 1
ARIS Views Screenshot



Source: ARIS Demo.

Figure 2
ARIS Reports Screenshot



Source: ARIS Demo.

ARIS Connect is the third overarching component of the system, developed to help "educators… share and refine best practices" (Liebman, 2010). Connect consists of:

- A *Resources* area, where teachers and staff can share resources by uploading and downloading files, web links and other information to support instruction.
- A *Communities* area, where teachers and staff can use a number of "web 2.0" tools, such as wikis and blogs, to communicate with colleagues both within and outside of their school about best practices and other issues.

Connect also provides each user with *My Inquiry Spaces*, where teachers are expected to keep a record of their activities on the school's inquiry team.

Previous Examinations of ARIS

To date, studies of ARIS have been limited in scope and have relied almost exclusively on self-reported information about teacher and administrator use and perceptions of the system. For example, the Office of the Public Advocate in New York City conducted a survey about ARIS among school principals in late 2008, during the initial rollout of the system (Gotbaum, 2009). The survey was disseminated to all of the City's 1,497 principals, but only 21 percent (315) of them responded.[vi] The final report found that while most of the principals surveyed

believed ARIS would improve teaching and learning in their schools, a "significant minority of principals" disagreed—feeling instead that ARIS "interferes with their jobs, is not a good use of their time or their staff's time, and will not improve teaching and learning in schools."

More recently, the Comptroller of New York City released an audit report on ARIS usage, based primarily on a survey of principals and teachers (Liu & Kim, 2012). The survey was sent to the principals and teachers in a random sample of schools. Out of a total of 25,515 surveys sent to 396 principals and 25,119 teachers, 14 percent (56) of the principals and one percent (281) of the teachers responded.[vii] The audit report—which also tapped ARIS's manual and other documentation, as well as the Gotbaum report as sources—argued that "many educators are not using the ARIS system to collaborate with other teachers as was intended, are using alternative computer systems to obtain information in place of, or in conjunction with, ARIS, and are not utilizing the system to its fullest extent" (Liu & Kim, 2012, p. 1). The comptroller's report further provided a number of recommendations to the DOE, including updating the data in ARIS more regularly, providing more training, and monitoring usage more closely.

Robinson et al. (2008), while not focused exclusively on ARIS, examined the system's role and potential as part of the school inquiry process. This study involved interviews with over 200 inquiry team members and close to 40 principals from a sample of 41 schools. The interviews were conducted in May and June of 2008, when ARIS was still very new and certain functions were not yet available. Overall, the report argued that, while frustrated with early challenges in the system and concerns over the utility of the training, most inquiry team members found ARIS to be a potentially "unprecedented resource for administrators, for teams, and for teachers" (Robinson, 2008, p. 95).

Finally, a 2010 report by the American Institute for Research (AIR) on ARIS implementation and usage also provided a relatively positive picture. The two-year study commissioned by the DOE drew its findings primarily from two surveys, with the most recent one completed by about 2,400 teachers across the City (Kidron et al., 2010).[viii] The study addressed a number of research questions, including: What is the current state of ARIS use, what teacher characteristics mediate ARIS use, and what "drives" ARIS use? The study focused on educators' attitudes and behaviors as well as their perceptions of ARIS and its utility. For example, the study found that "teachers who believe in the importance of data and who are comfortable with technology use ARIS more" (p. ix). Although the study drew on some usage data provided by the DOE, the information provided only a superficial look at how much ARIS was used across the City overall.

These previous studies of ARIS are based largely on self-reported information from small samples of self-selected teachers and other educators. Our study is the first to rely directly on records of actual usage to assess whether, when and how much educators are using this

centralized data system and virtual collaboration and planning tool. By analyzing actual clickstream data—background data that are generated every time an individual logs onto ARIS—we were able to get a clear look at how much ARIS was used during the 2010-2011 year, when it was used, and what features were used most often. In addition, we relied on teacher surveys and interviews with administrators, data specialists and teachers to provide further context for these usage analyses. As discussed in the next section, we sought to understand how teachers and administrators are experiencing ARIS or what institutional and other variables might influence the system's use.

III. DATA SOURCES, MEASURES AND ANALYSES

This study takes an in-depth look at how educators use a tool designed to make schools more data driven, addressing three overarching research questions: To what extent and in what ways do educators use ARIS? What do educators see as the strengths and limitations of the system? And what enhancements and supports do educators believe would make ARIS more useful? We used three strategies to investigate these questions, each corresponding to a different data source: ARIS clickstream records, surveys and interviews/focus groups. This chapter provides a detailed description of each data source, how we cleaned and analyzed the data, and the key measures that were examined. At the end, we outline the strengths and limitations of this three-pronged approach and the extent to which these data can be used to draw larger conclusions about ARIS.

ARIS Clickstream (Usage) Data for All New York City Schools

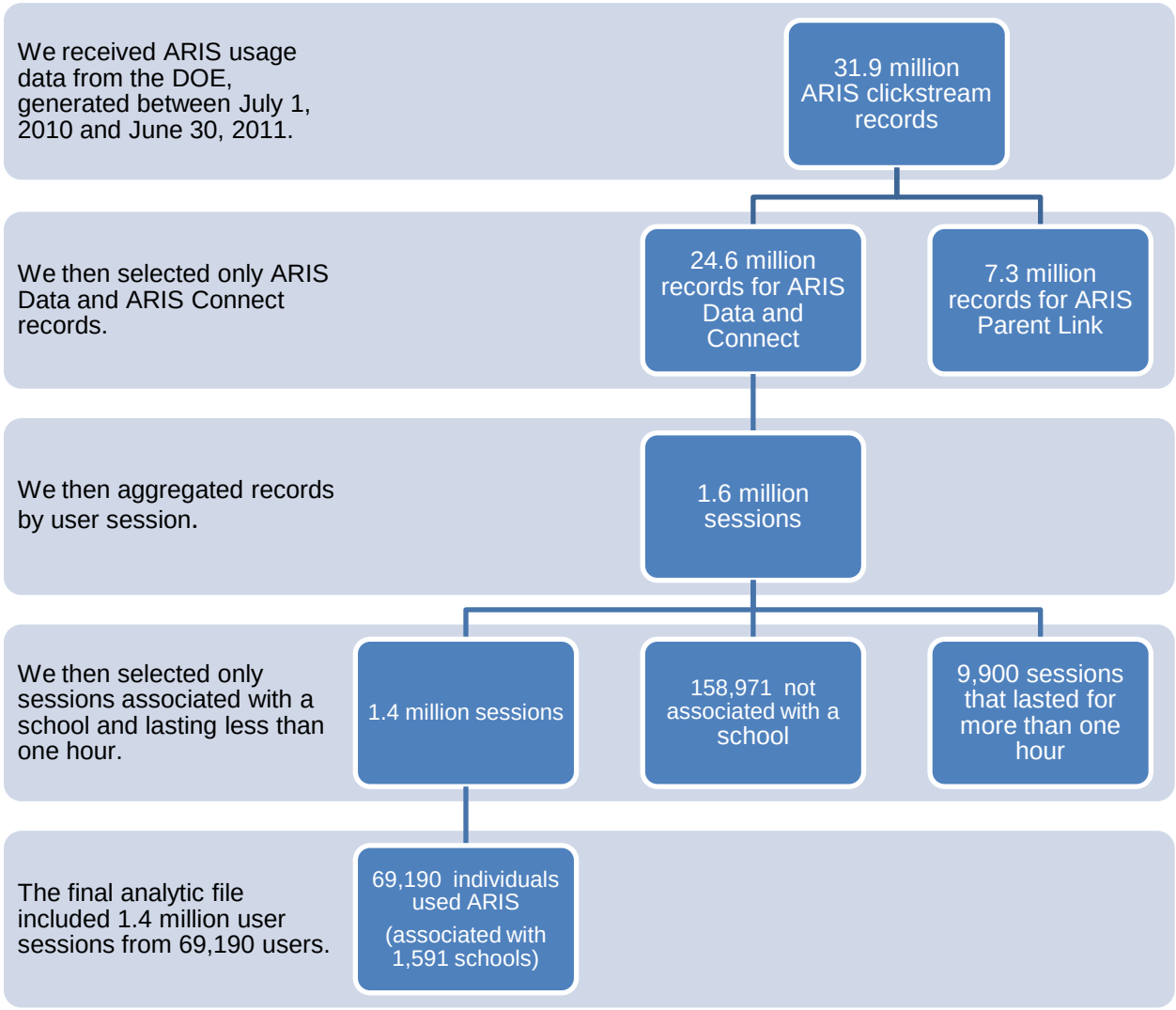
To answer the first research question—to what extent and how do educators use ARIS?—we analyzed the actual clickstream data that are generated every time someone logs on and uses the system. This enabled us to conduct a thorough examination of how much and in what ways ARIS was utilized across the city during the 2010-2011 school year. Our approach, which is similar to the one used by Tyler (2012) to analyze a data system in Cincinnati, provides the only detailed, system-wide, empirical examination of ARIS use to date.

Data Collection/Sample.

Clickstream records are generated each time an individual logs on and commits an action in ARIS, such as clicking on a Views page in ARIS Data, using one of the tools in Reports, or updating a communities page in ARIS Connect. The records include flags for the "session," which starts when a user logs on and ends when the user either logs off or times out of their session. The records also have a timestamp, which registers the date and time of each session, and a unique number that identifies each user. The school that is associated with the user is noted in the record, as is information about the data, tools or areas in ARIS that the user visited and used.

For this study, we examined clickstream data that were generated from ARIS between July 1, 2010 and June 30, 2011 and provided in 365 files to the Research Alliance by the DOE. This 12-month period represents an entire school year, including the planning periods and summer break. The files contained approximately 31.9 million records. Around 7.3 million (23 percent) of these were associated with ARIS Parent Link, and as mentioned previously, we omitted the Parent Link records from our study. This was the first of several layers of filtering that were undertaken to construct a consistent and still comprehensive ARIS clickstream database for our analyses. For a graphic display of our data cleaning process, see Figure 3.

Figure 3
Research Alliance Data Cleaning Process for ARIS Clickstream Data



We cleaned the file further by identifying and removing user sessions that might reflect outlying user behaviors and thus skew the results of our analysis. One concern was that some users may have logged on to the system and walked away without logging off, creating what only appeared to be a very long user session. As we discuss in the next chapter, the average session lasted for just over five minutes, with approximately 20 percent of sessions lasting for more than a half hour. As a conservative measure to limit the influence of extremely long sessions, we excluded the 9,900 user sessions (0.6 percent of all sessions) that lasted for more than one hour.

Finally, a total of 158,971 ARIS sessions (9.6 percent) were not associated with a particular school or user. Thus, it was not possible to include these records in calculations of ARIS usage per user or school, and we excluded these records from our analysis.

At the same time, we identified a total of 1,885 individuals (2.8 percent of all users) who used ARIS in connection with two or more schools. We were unable to effectively identify these individuals, but assumed for this study that they held some kind of central or network-level role that allowed them access to data from multiple schools. We treated each of these affiliations as a separate user (with each user attached to a different school). In this way, our analysis is consistent with how ARIS functions; the system allows users to be affiliated with only one school at a time, and separate sessions must be initiated to view information for different schools. For analytic purposes, we wanted to treat each of these sessions as though a separate individual were accessing data for each school.

After the cleaning process was complete, the data we would analyze for this study included nearly 1.5 million login sessions, encompassing more than 111,510 hours of usage. This file was comprised of 69,190 school-affiliated ARIS users who were associated with 1,591 schools.

A key goal of this study was to determine the variation in ARIS usage by individuals who occupy different staff roles within schools and the DOE. The ARIS usage data flagged each user with a particular role, including School Educator, School Principal, Data Specialist, School Inquiry Team Member, School Wide Student Data Viewer, and others. We learned from the DOE these roles determine the level of access an individual has to the data in ARIS. For example, the School Educator role, which is generally assigned to teachers, only affords access to the data on students in a particular classroom. A School Principal has access to information about all the students in his or her school, as do the users labeled Data Specialist and School Inquiry Team member. We used these assigned roles to help us determine the kind of user logging onto ARIS and their level of access within the system. In cases where individuals were assigned multiple roles in ARIS, we selected the most recent role.

Although the clickstream file provided a user's role in ARIS, it did not provide their actual staff position within the district. Thus, as a final step, we matched the clickstream file to human resources (HR) information provided by the DOE for the 2010-2011 school year. We matched these files using a unique employee identification number that was present on both files. The HR file provided basic information about district staff, including their assigned job title and any licensing information. In addition to helping us distinguish between teachers and administrators, these files enabled us to parse the administrator category, identifying principals, assistant principals, and staff who provided other socio-emotional support, such as guidance counselors or school psychologists, etc. We also used the HR data to determine the subjects that teachers taught and the type of school (elementary, middle, etc.) with which each user was associated. Although the school information was also present in the clickstream file, we used the HR data as the primary source for our analysis of usage by school type. In cases where this information was missing from the HR file, we used the school information found in the ARIS file.

Analysis.

Our goal in analyzing the ARIS clickstream data was to provide an accurate picture of how much and in what ways ARIS was used during the 2010-2011 school year. To accomplish this, we summarized different measures of use (total hours of usage, minutes of usage per user, number of log in sessions, etc.) for the entire school year and by month. We examined usage by individuals in different positions (teacher, administrator, etc.) and in different kinds of schools (elementary, middle, high school, etc.).

We also used the clickstream data to identify different categories or "types" of users: *Light* users were those who accessed the system less than 15 minutes during the year, *moderate* users between 15 and 90 minutes, and *heavy* users more than 90 minutes. Each category represents roughly a third of all users. Overall, these usage types provided us with a way to examine engagement with ARIS—from relatively superficial users to those who were more involved with the system. We combined the user types with information from the HR files to determine, for example, how many teachers were light, moderate or heavy users and how this compared with principals or other staff. Finally, we examined the number of light, moderate and heavy users in elementary, middle, high school and other school types.

Surveys of Middle School Teachers

In addition to our analysis of ARIS clickstream data in New York City schools, our study also sought to learn about how educators perceive the utility of ARIS and what changes they believe would strengthen the system. To accomplish this, we conducted a survey to learn

Clickstream Data Measures

- *Number of unique users*, which we created by conducting an unduplicated count, based on the unique ARIS identifier. This enabled us to track the number of individual users for the entire year and each month.
- *Sessions*. We calculated the number of sessions overall and for each ARIS user. A session begins when a user logs onto the system and ends when they logoff, are timed out, or close their browser and leave ARIS. We calculated the total number of sessions during the year and then divided it by the number of users, to get an average number of sessions per user. The number of sessions per user ranged from only 1 to over 8000 (see Table A1 in Appendix A).
- *Duration*. The timestamp in each clickstream record allowed us to determine the duration or the length of time for each user session (See Appendix B for details about the way we calculated duration). Once we had a measure of session duration, we were able to calculate several other measures that were used throughout the study:
- *Total hours/minutes*, or the sum of all session times.
- *Minutes per user*, which was generated by dividing the total minutes by the number of users.

more about how educators view and interact with ARIS, including questions that could be answered even by people with limited or no experience with the system. Overall, the survey helped us gain a deeper understanding about which parts of ARIS teachers felt comfortable using, as well as the tools that they find unfamiliar, not useful or confusing.

Data Collection/Sample.

In an effort to contain costs and to control for some of the organizational factors that are likely to influence teachers' use and perceptions of ARIS, we focused our survey on middle schools—schools serving students in grades 6 through 8. Including elementary, middle and high schools would have confounded potential differences in ARIS usage and perceptions with inherent differences in the types of information available to teachers in each school type. For example, elementary schools do not rely on information about credit accumulation or Regents exams, while high schools are less concerned about the test scores that are so critical for grades 3 through 5. In short, we decided to focus on middle schools, which were likely to have access to (and use for) common data in ARIS and which have common institutional structures and procedures.

To capture information for the full spectrum of middle schools, we selected a sample that would be representative of middle schools across the city, in terms of how much they use ARIS. We selected our initial sample of schools using a file provided by the DOE that contained summary ARIS usage data by school from January 2009 through December 2010.[ix] To control for school size, we calculated the average amount of ARIS usage per student. We restricted the sample to schools with at least 10 unique ARIS users, to eliminate schools with no or extremely limited ARIS usage during the two-year period.

From the resulting pool of 244 schools, we stratified the sample into two groups: one consisting of the top 40 percent of schools, in terms of ARIS usage, and the other containing the bottom 60 percent of schools. We then randomly selected a sample of 20 schools from the first group and 30 schools from the second group. Our goal was to get 25 of these 50 schools to participate in the survey. We sent invitations to all 50 schools and received agreements to participate from 23. Of these, 10 schools came from the first group of "high ARIS use" schools and 13 came from the second group of "moderate and lower ARIS use" schools. We were not able to determine why the remaining schools did not agree to participate.

Our analysis of school characteristics suggests that the 23 surveyed middle schools are very similar to the City's grade 6-8 middle schools overall (N=250). Participating schools were located across the City in four of the five boroughs. We found that they were not statistically different from middle schools overall, on a range of important school characteristics, including the percent of students with free and reduced price lunch, the percent of ELL students, the percent of students with disabilities, the school's enrollment size, state test scores, number of teachers, and the percent of teachers with a master's degree or higher.[x]

The overall response rate among teachers in the 23 participating schools was 57 percent. We used the DOE HR data for Spring 2011 to estimate the total number of teachers school staff and did not include school administrators in the denominator. The 57 percent response rate includes a small number of school staff who reported that they have responsibilities outside of the classroom (such as staff developers, guidance counselors, and others), and it is possible that some of these individuals may not be included in the counts from the HR database. These individuals account for about 2 percent of all survey respondents and thus, may inflate the teacher response rate by a small amount.

Analysis.

The goal of the survey analysis was to provide a picture of what middle school teachers, overall, think about ARIS and how the system could be improved. We focused primarily on presenting summaries of the responses to individual items, such as the percent who responded "yes" or "agreed," etc. In some cases, we combined responses (such as "agree" and "strongly agree"). We only combined items to create separate measures for validation purposes (see Appendix B). We looked at the responses as a whole and did not try to discern differences by category (different schools, for example). We felt it was important to avoid reporting any results that were based on much smaller cell sizes, to maintain the integrity of the analysis.

Survey Data Measures

The survey was designed to elicit information about how middle school teachers perceive the utility of ARIS and its different functions, including its limitations. The survey questions focused on three overarching areas of inquiry:

- The content in ARIS (questions about what teachers and administrators find most/least useful about the content on ARIS for their work);
- The support that educators have received (questions about their access to technical support and professional development opportunities, to help them make sense of the information in ARIS); and
- The time they have to use the system.

To view the survey instrument, go to: Appendix C

Interviews and Focus Groups in Middle Schools

In the 10 "high ARIS usage" schools that were surveyed, the research team also conducted fieldwork, to provide additional information about user perceptions of ARIS. The fieldwork consisted of focus groups with teachers and interviews with administrators and with the data specialist of each school (who was often the heaviest user of ARIS and the most knowledgeable about the system). The interviews and focus groups allowed us to probe deeper about user experiences, the context around ARIS's implementation, the perceived pitfalls of the

system and what would make it better. This approach allowed us to cull detailed information about ARIS from both an administrative and an instructional perspective.

Data Collection/Sample.

The fieldwork sites were the same 10 high ARIS usage schools that were selected as part of the survey sample. The research team chose high-usage schools, as they were more likely to have experience with the system and to include a diverse pool of users who play different roles in the school. The sample included a wide spectrum of schools in the top 40 percent of ARIS use, and consequently there is a high degree of variability in usage across these schools.

The research team visited the 10 schools over a three-week period from March 25 through April 14, 2011. This period was chosen, in part, because it occurred immediately prior to the state English Language Arts (ELA) and Math tests and potentially represented a time of relatively high ARIS use. Each school visit lasted two to three hours and included interviews with the principal and data specialist as well as a focus group of 5 to 7 teachers. Interviews and focus groups lasted about an hour.

The site visits were conducted by a minimum of two Research Alliance researchers: one who asked questions from the protocol and another who took quasi-verbatim notes (most interviews and focus groups were also audio recorded). In all, we conducted 10 teacher focus groups and interviewed 9 principals and 9 data

Interview and Focus Group Themes

The research team designed multi-part interview/focus group protocols to address how principals, data specialists and teachers perceive and use ARIS. The protocols and our analytic approach focused on three core constructs that influence ARIS usage, broadly categorized as content, support and time (the same general areas that were examined in the survey).

- The content questions focused on what features of the system educators used the most/least, how they used different features, and what changes they would like to see in ARIS.
- The support questions focused on the quality and quantity of training educators received as well as how their school provided support for using the system.
- The time questions focused on how the schools structured time for ARIS (and data use in general) and how they used ARIS to facilitate collaboration.

To ensure that the interview and focus group protocols were clear and meaningful to the people we spoke with, we submitted them to extensive review by current teachers and principals, prior to conducting the site visits.

For the interview and focus group protocols, see: Appendix C

specialists (and a few assistant principals, guidance counselors, coaches, parent coordinators, and IT coordinators). We maintained consistency throughout the site visits by closely following our interview protocol and asking targeted questions. Following the interviews and focus groups, researchers wrote up short reflection memos, which helped guide the more in-depth analysis of the taped transcripts, described below.

Analysis.

Using *Atlas.ti* (qualitative data analysis software), two researchers read through each transcript and generated codes that reflected recurring themes in the data.[xi] The codes were organized according to the three constructs that structured the interview and focus group protocols and the survey—content, time and support—as well as an additional category of "other," which included any additional themes that emerged in our interviews. The codes were drawn from the transcript data, as well as some high-level issues originally culled from the reflection memos that were drawn up immediately after each site visit. Sample constructs included: *content/access to data* or *content/My Students tab*, or *support/training*. The research team used these codes to organize select quotes that were most representative of themes that could be found in as many schools as possible. Team members met often to discuss various codes and themes and to note redundancies or missing ideas. The large majority of the researchers' coding was well aligned; in places where it was not, we discussed and revised accordingly.

Strengths and Limitations of this Approach

The data sources and samples available for this study of ARIS offered an unprecedented opportunity to learn about the system's usage and utility, and enabled several advances over previous studies and reports. First, the use of clickstream records allowed us to measure actual time spent online with the system as it occurred, rather than self-reported recollections of past usage. The clickstream records also allowed us to determine the specific features of ARIS that educators used and the allocation of their time across these features. In addition, by matching this information with HR data, we were able to discern in more detail who used ARIS, including the subjects they taught and their position within the district. Finally, the clickstream data are available for everyone who used ARIS, not just a sample.

With the clickstream data capturing actual ARIS usage, the surveys, interviews and focus groups allowed us to discern the perceptions of users—what they see as the pros and cons of ARIS and where they perceive areas for change or improvement in the system. The samples of teachers and administrators who provided information through the surveys and fieldwork were selected more systematically than previous efforts, and they are more representative of the populations from which they were drawn.

There are also, however, a number of limitations to the data and samples for this study. First, while the clickstream data provides rich information about the time individuals spent

online using the system, it does not capture other time that educators may have spent offline with ARIS data, for example, using the printouts, spreadsheets, and other paper reports that can be generated from the system. The clickstream data also does capture the extent to which ARIS users may have distributed information from the system to other staff in their schools. Thus, these data may underestimate the overall use of information from the system.

In addition, the time stamps on the clickstream records only record the length of time users remained logged on to a particular ARIS webpage or report. We are not able to determine specifically what ARIS users did during the time they were accessing the system's components and pages. Some users may have been deeply engaged in analyzing the information on their screen, while others may have left their computers for long periods of time, without paying much attention to the information they had accessed. Similarly, the ARIS clickstream data do not provide a record of when a user left ARIS to access another online system that contains information about students—most notably, the Acuity website, which provides detailed information about students' performance on periodic Math and English Language Arts assessments.

Furthermore, our analysis examined ARIS usage data for only the 2010-2011 school year. ARIS has continued to evolve, as has the professional development and support offered by the DOE. Future analyses will need to address whether and how usage patterns may be changing over time.

It should also be noted that the results from the survey only reflect the perceptions of a sample of middle school teachers. The perceptions of elementary and high school teachers may be different. Also, although the schools in the survey sample are very similar to all of the City's middle schools, based on a number of important characteristics, there may be some unmeasured differences in either the schools or the responding teachers that could limit the generalizability of the survey information.

As with most surveys of individual behaviors and perceptions, some of the questions on the ARIS survey required respondents to recall events or processes that occurred in the past, either earlier in the school year or in previous years. Responses to these questions may vary depending on individual memory. The responses to the survey were anonymous, and as a result, we were unable to link responses to records of each teacher's actual ARIS usage—to get a sense of whether their perceived and actual usage were aligned. In addition, we were unable to verify their self-identification of the subjects they teach or other duties or responsibilities they perform in their school.

Finally, the schools that participated in the interviews were selected from among middle schools with evidence of higher than average ARIS usage. While this increased the likelihood of gaining the perspective of informed ARIS users, the sampling strategy may not reflect the full range of perspectives on the system.

Acknowledging these limitations, this study provides a more comprehensive and systematic examination of ARIS usage and of educators' perceptions of the system than any previous study or review. Our findings are presented in the following two chapters.

IV. ARIS USAGE

This chapter describes findings from our analysis of ARIS usage data (clickstream records) for the 2010-2011 school year, addressing our first core research question: To what extent and in what ways do educators use the system? While previous studies have made educated guesses about ARIS use by surveying samples of users, this is the first study to examine the system's clickstream records to develop a systematic profile of *how much* ARIS is being used, *which features* are being accessed most frequently, *when* the system is being used and *by whom* (in terms of both individual users and the schools they represent). Each of these dimensions is important for understanding whether ARIS is accomplishing its goals and, more broadly, for building knowledge about the potential of such systems to support the work of teachers and school administrators.

How Much Was ARIS Used?

Perhaps the most fundamental question about ARIS usage is how much the system is actually being accessed by the people it was designed for—the teachers and administrators in New York City's public schools. To address this question, we examined clickstream data from 2010-2011 to determine the proportion of the city's educators who used the system throughout the year, and how heavily they used it, on average. We found that:

About 73 percent of educators in New York City's public schools used ARIS during the 2010-2011 school year.

In all, 69,190 educators logged on to ARIS at least once during the 2010-2011 school year. This number represents roughly 73 percent of the city's teachers and administrators.[xii] Our analysis shows that about 67 percent of all teachers logged on during the year, as well as 94 percent of all principals, 84 percent of all assistant principals, and around 60 percent of other administrative staff. A much smaller percentage of other educators with different staff roles, such as administrative assistants and community superintendents, accessed ARIS during the year.

How much they used the system varied; on average, educators logged on to ARIS 21 times over the course of the year, for about five minutes per session.

Table 1 provides some detail about overall ARIS usage during the 2010-2011 school year, including the number of sessions users conducted, as well as the total amount of time they spent on the system. All 69,190 users logged on to ARIS for a total of 1.4 million sessions, or about 21 sessions per user on average. These users spent a total of 111,510 hours using ARIS during the course of the year. This amounted to about 97 minutes per user.

The frequency of usage by individual ARIS users varied from only once during the year to well over 200 times (see Table A1 in Appendix A). About 21 percent of all ARIS users only logged on to the system once during the entire school year.

Each individual session on ARIS also varied from extremely brief (1 second) to quite lengthy (1 hour). Our analysis shows that most ARIS users went onto the system for very short periods of time. The average ARIS session lasted around five minutes. But approximately 70 percent of all sessions were actually less than five minutes long, and only 6 percent were longer than 20 minutes.

Overall, these data suggest that most educators in the New York City public school system accessed ARIS at least once during the 2010-2011 year. Usage varied considerably in terms of the number of times they accessed the system and the amount of time spent on the system. Most sessions were quite short.

Table 1
Overview of ARIS Usage, 2010-2011

Measures	Full School Year
Sessions	
Total sessions	1,450,122
Sessions per user	21.0
Duration	
Total hours	111,510
Minutes per user	96.7
Minutes per session	4.7
Number of Users	69,190

Source: 2010-2011 ARIS (clickstream) records.
Notes: Total hours figure includes combined time of all users on ARIS. Per-user figures reflect totals divided by total number of users.

Which Features of ARIS Were Used Most?

In addition to gauging how much the system was being used overall, we also wanted to understand which features were being accessed most frequently. Were some parts of ARIS generating significantly more traffic than others? Or was the entire system being used as designed? We discovered that:

The vast majority of ARIS use was in the ARIS Data section of the system.

ARIS users accessed a variety of data and functions during the year, with a heavy concentration in the ARIS Data area, which includes individual, class and school-level data. Overall, ARIS users spent slightly more than 90,000 hours in the ARIS Data Area, which accounts for about 80 percent of their total time on ARIS during the year. The other 20 percent of their time was spent in the ARIS Connect area.[xiii] (See Table 2 on the next page.)

Table 2
Time Spent in ARIS by System Area, 2010-2011

System Areas and Measures	Full School Year
ARIS Data Areas	
Individual Student Profiles	
Total hours	29,700
Minutes per user	25.8
Views	
Total hours	38,315
Minutes per user	33.2
Data Reports	
Total hours	5,891
Minutes per user	5.1
System Navigation	
Total hours	16,277
Minutes per user	14.1
All ARIS Data Areas	
Total hours	90,184
Minutes per user	78.2
ARIS Connect Areas	
Total hours	21,326
Minutes per user	18.5
Number of Users	69,190

Source: 2010-2011 ARIS (clickstream) records.
Notes: ARIS Data areas include data and reports from the My Students and Reports tab in ARIS. System navigation refers to the time spent logging on, searching and other user actions.

Within ARIS Data, users spent most of their time accessing information through the My Students tab, which includes the Views and Individual Student Profiles. Users occupied about 38,000 hours, or 34 percent of their use of ARIS, looking at Views. The Views area provides teachers with class lists, featuring students' data in rows; these data may be summarized at the classroom level for school administrators and at the school level for central administrators. Users spent about 33 minutes on average in the Views section of the system.

The Individual Student Profiles were used almost as frequently as the Views section. The Individual Student Profiles allow users to view comprehensive information about each New York City public school student, including their test score histories, demographic information, basic information about their ELL or special education status, home contact information, and other data. Educators spent a total of about 30,000 hours or 26 minutes per user in this area. Together, the Views and the Individual Student Profiles account for about 68,000 hours, which represents three quarters of ARIS Data use and about 60 percent of the total hours on ARIS.

Users did not spend much time using the Reports tools, relative to the Views and Individual Student Profiles. The ARIS Reports area allows users to manipulate the data they have access to and generate various kinds of reports. It can be used to compare subgroups of students or even conduct complex statistical functions like regression analyses (which might be used by an Inquiry Team member, for example, to explore the relationship between attendance rates and test scores). Reports is the only tool in ARIS that offers analytical functions that go beyond simply displaying data. Given this capacity, it is somewhat surprising that users accessed Reports for only about 6,000 hours, or about 5 percent of the total time in ARIS.

Finally, users occupied about 18 percent of their time in ARIS Data in "system navigation." This includes the time used to log on and off or travel from page to page in ARIS.

The ARIS Connect feature was used infrequently.

The other major component of ARIS that was designed for educators is the Connect feature, which allows users to seek and share resources; blog about any topic of their choice, including their teaching experiences, best practices, etc.; and create wikis to share information and collaborate on the creation of instructional materials. Users accessed ARIS Connect for 21,326 hours, or about 20 percent of all ARIS usage time. Unlike the ARIS Data area, the clickstream data from ARIS Connect did not provide enough detail to identify which areas within Connect users accessed the most or least. Thus, at this point, we do not know whether users spent more time in Connect uploading and downloading resources, such as articles or other documents; updating a blog or wiki; or updating their Inquiry Spaces.

When Was ARIS Used?

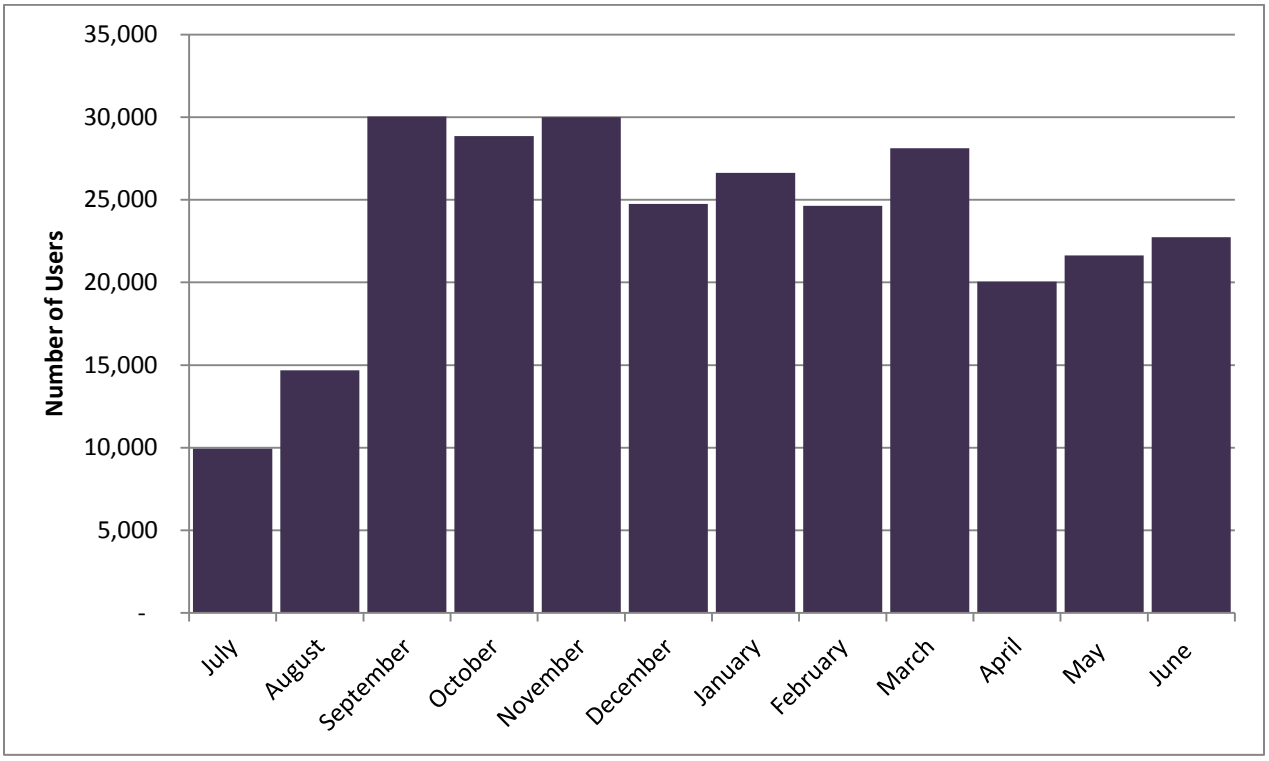
To achieve a more nuanced look at ARIS usage, we wanted to understand if the system was used consistently throughout the year, or if there were distinct peaks and valleys associated with different parts of the school calendar. We also wanted to assess whether different features were used more or less heavily at different times. Both sets of analyses were important to begin to get a picture of not just how much ARIS was being used, but *in what ways.* Heavier ARIS use at certain times of the year might signal that the system was being used for certain functions (for example, teachers preparing for their incoming classes at the beginning of the year). Our analyses revealed the following:

ARIS was accessed throughout the year, with heavier use during the early months.

Both the number of users and the amount of time spent using the system varied at different points during the school year. Figure 4 illustrates the month-to-month variation in the number of ARIS users who logged on to the system at least once during each month. On average, about 23,000 unique users (approximately one third of all users) logged on to the system each month. The number of users ranged from a low of about 9,000 in July 2010 (the start of summer vacation) to a high of around 30,000 in September 2010 (the start of the school year). During the

nine months of the school year, the number of users remained relatively stable, declining somewhat after November. The number of users increased again in March and then dropped in April.

Figure 4
Unique ARIS Users
Per Month (2010-2011)



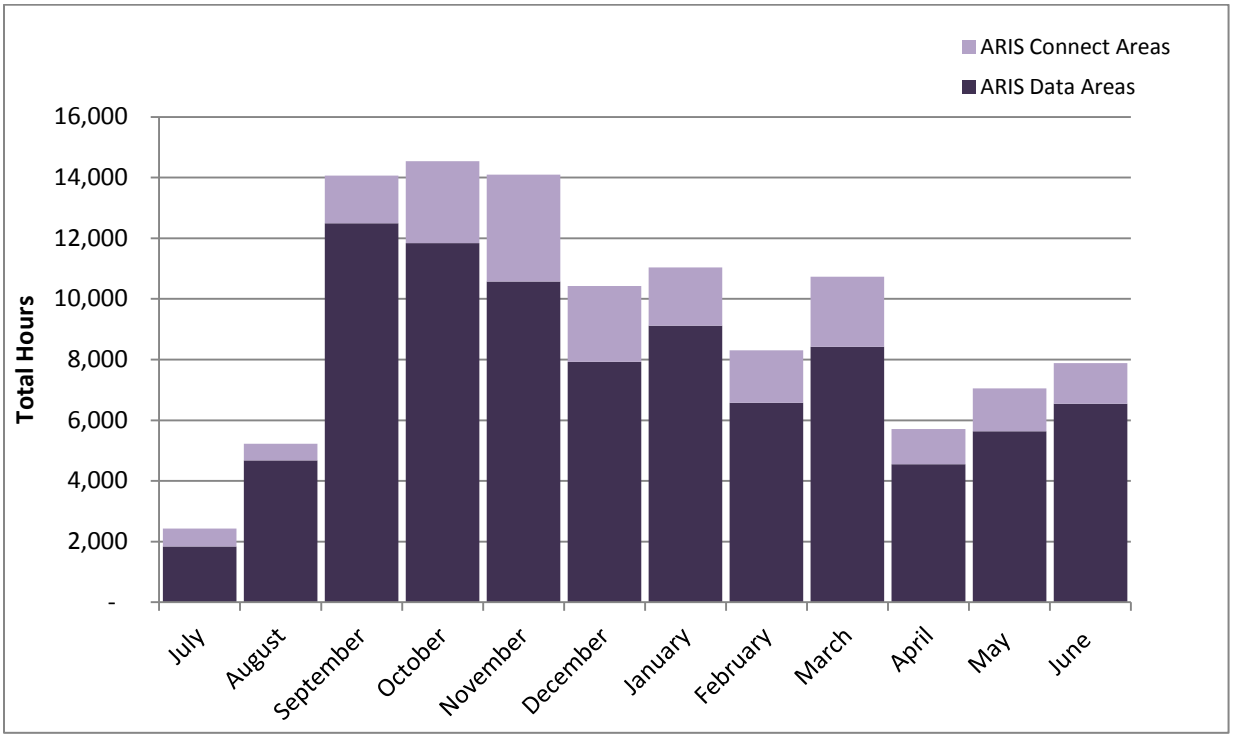
Source: 2010-2011 ARIS Usage (clickstream) data.
Notes: Includes unduplicated count of users each month. Users are counted in multiple months.

The monthly pattern of use looks somewhat similar when the unit of measurement is changed from numbers of ARIS users to amount of time on ARIS (see Figure 5 on the next page). However, the difference between the beginning and end of the school year is more dramatic when examining hours of use, with a sharper decline after November. In fact, close to 40 percent of all the time on ARIS in 2010-2011 took place in September, October and November. During this period, users were on the system for close to 43,000 hours, which is more than the time spent during the five month period from February to June.

This pattern (and the sharper decline in hours of use, compared with numbers of users) could reflect more robust use in the fall, which then trails off as the year progresses. In fact, when you look at individual usage of ARIS, or average minutes per user, this shift toward shorter sessions during the latter part of the year is also apparent (see Table A2 in Appendix A). For example, although there are more or less the same number of users in March and October, in

March, each user spends 18 minutes on average on the ARIS Data area, compared to about 25 minutes per user in October.

Figure 5
ARIS Usage in Hours
Per Month, 2010-2011



Source: 2010-2011 ARIS Usage (clickstream) data.
Notes: Includes total hours on ARIS, disaggregated by the ARIS Data and ARIS Connect components.

Use of ARIS Connect and ARIS Data peaked at different times.

During the 2010-2011 year, as seen in Figure 5, the use of the ARIS Connect feature followed a slightly different pattern over time, compared with the use of the ARIS Data area. September was actually a relatively low period compared to other points in the year. During that month, users spent a total of about 1,500 hours on all Connect features or about 3 minutes on average per user. Use of Connect grew in October and then peaked in November at 3,522 hours or 7 minutes per user, returning back to lower levels the following months (see Table A2 in Appendix A for details).

Again, without the capacity to disaggregate usage between the different features in Connect, we are unable to see whether there is any appreciable difference in the use of the resources pages and user/inquiry team pages. Anecdotally, we understand that the relative increase in Connect use in November coincides with more intensive work on the part of the school-based inquiry teams and their efforts to identify students who are struggling after the first

month or two of school. This may have led educators to access ARIS Connect more frequently to search for resources and/or record their findings.

Apart from some slight variations, the use of the different ARIS Data tools did not vary much from month to month (see Table A2 in Appendix A). Use of the Views feature appears to spike somewhat in September, to close to 7,000 hours or 14 minutes per user, while use of the other tools seem to remain constant throughout this period. This spike may represent heavier use of ARIS by teachers accessing data about students in their new classes and beginning to plan for the year.

Who Used ARIS?

The above averages, both overall and across time, mask great variation in how ARIS was used by individuals. In addition to understanding broad trends in usage, we also wanted to know as much as possible about how different educators were using the system. To begin to shed light on this question, we first categorized users based on the time they spent on ARIS during the 2010-2011 school year, putting them into three groups: *Light* users (who used the system for less than 15 minutes during the year), *moderate* users (15 to 90 minutes) and *heavy* users (more than 90 minutes). The groups represent 37, 35 and 28 percent of the total population of ARIS users, respectively. Though each of the groups had roughly equivalent numbers of users, their time on the system varied considerably.

We also sought to understand whether people in different positions within the school system—teachers versus administrators, teachers of different subjects, and educators with school-wide roles versus those without—had varying patterns of use. Our findings about these different groups are presented in the following section.

"Heavy" ARIS users accounted for about 80 percent of total time on the system.

During the 2010-2011 year, heavy users logged on to the system for more than 1 million sessions, compared to the light and moderate users, who had a total of about 367,000 sessions, combined (see Table 3 on the next page). Individually, heavy users conducted 55.6 sessions on average, compared to only 3.4 and 11.6 sessions on average for light and moderate users, respectively.

The heavy users were also on ARIS for much more time, compared to the two other types of users. Heavy users were on ARIS for a total of 91,967 hours, compared to 19,543 hours for both the light and moderate users, combined. Thus, 28 percent of all ARIS users accounted for 82 percent of the total educator time on ARIS during the year.

Table 3
ARIS Sessions and Duration by Type of User, 2010-2011

System Areas and Measures	All Users	Heavy Users	Moderate Users	Light Users
ARIS Sessions				
Number of sessions	1,450,122	1,082,611	282,235	85,276
Sessions per user	21.0	55.6	11.6	3.4
ARIS Duration				
Total hours	111,510	91,967	17,710	1,833
Minutes per user	96.7	283.3	43.7	4.3
Number of Users	69,190	19,475	24,294	25,421

Source: 2010-2011 ARIS (clickstream) records.
Notes: "Heavy" users accumulated a minimum of 90 minutes of ARIS usage during the year. "Moderate" users accumulate between 15 and 90 minutes, and "Light" users accumulated fewer than 15 minutes during the year.

The kind of material heavy users accessed in ARIS did not vary significantly from that of light and moderate users. Both the moderate and heavy users spent approximately 80 percent of their time in the ARIS Data area (see Table 4 on the next page). The heavy users spent a somewhat larger proportion of their time examining individual Student Profile information (28 percent of their ARIS Data area time, compared to about 10 and 20 percent for the light and moderate users, respectively). The heavy users did not use either the more analytic Reports function or the Connect feature disproportionately more than the other types of users. This suggests that while the heavy users are on ARIS more than other users, they are not generally engaging in comparatively more complex uses of the system.

Table 4
Use of ARIS Components by Type of User, 2010-2011

System Areas and Measures	All Users	Heavy Users	Moderate Users	Light Users
ARIS Data Areas				
Individual Student Profiles				
Total hours	29,700	26,111	3,411	179
Minutes per user	25.8	80.4	8.4	0.4
Views				
Total hours	38,315	30,772	6,869	674
Minutes per user	33.2	94.8	17.0	1.6
Data Reports				
Total hours	5,891	4,659	1,088	143
Minutes per user	5.1	14.4	2.7	0.3
System Navigation				
Total hours	16,277	13,110	2,716	451
Minutes per user	14.1	40.4	6.7	1.1
All ARIS Data Areas				
Total hours	90,184	74,653	14,084	1,447
Minutes per user	78.2	230.0	34.8	3.4
ARIS Connect Areas				
Total hours	21,326	17,314	3,626	386
Minutes per user	18.5	53.3	9.0	0.9
Number of Users	69,190	19,475	24,294	25,421

Source: 2010-2011 ARIS (clickstream) records.
Notes: "Heavy" users accumulated a minimum of 90 minutes of ARIS usage during the year. "Moderate" users accumulate between 15 and 90 minutes, and "Light" users accumulated fewer than 15 minutes during the year.

ARIS use varied depending on an individual's position in a school and their level of access to the data in the system.

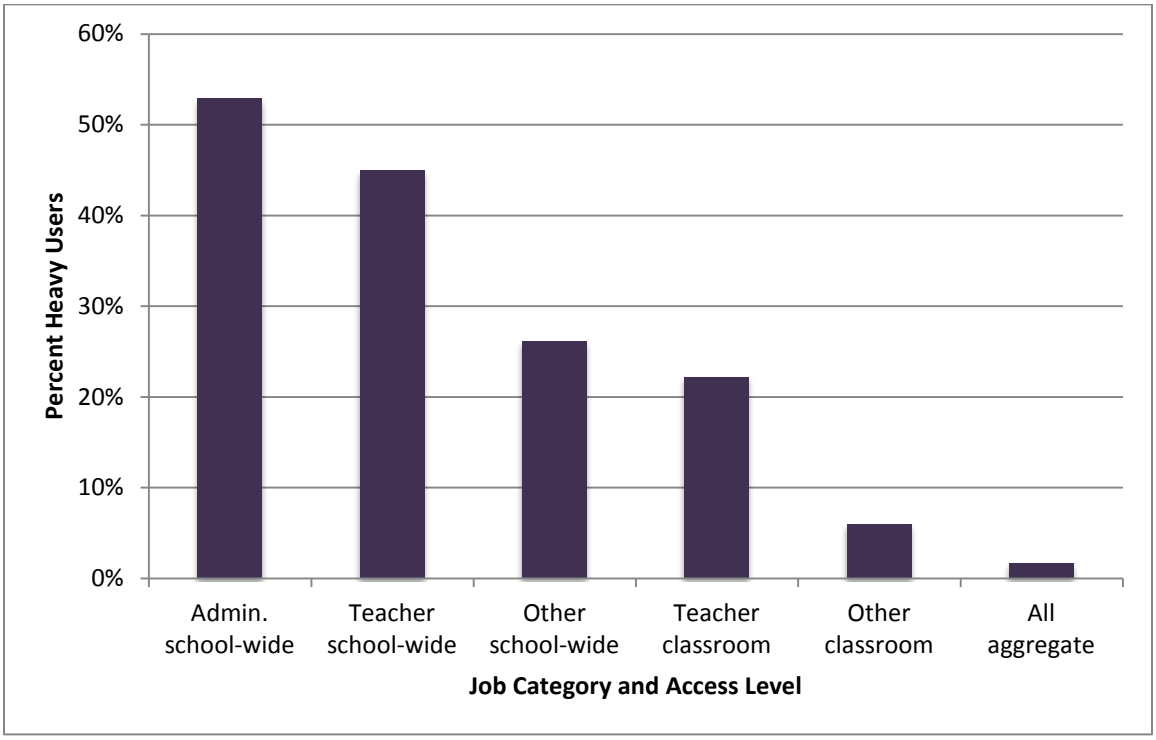
In examining whether individual characteristics were correlated with different patterns of use, we were particularly interested in whether usage among teachers varied depending on the subjects they taught, as well as any differences that might exist between teachers' and administrators' use of ARIS. We also wanted to know whether teachers who occupied roles that went beyond the classroom, such as data specialists, coaches, and inquiry team members, used ARIS differently from teachers whose roles were confined to the classroom. We used two data sources for this component of our analysis: the HR files, which we matched to the usage data, and the ARIS clickstream data, which had roles assigned to each user. (See Chapter III for more details.)

Using the HR information, we were able to determine that about 52,000 or 76 percent of all ARIS users were teachers, while another 4,000 or about 6 percent were administrators (see Table A3 in Appendix A for details). In subsequent analyses, we looked at the subjects teachers taught, and found some variation in ARIS use. We found that on average, math teachers were slightly more likely to be heavy users than teachers of other disciplines. ELA, social studies, and science teachers were all very similar in the amount they used the system.

After examining usage by staff position in the school, we then looked at the role they were assigned in ARIS. ARIS roles are assigned in Galaxy, the budgeting system used by all New York City public schools and one of the source systems feeding ARIS. The user role in ARIS determines an individual's level of access to the data in the system. Principals and other administrators all have the School Principal user role, which affords them access to information about all of the students in their buildings. Teachers may serve in a variety of roles, with different levels of ARIS access. Nearly 70 percent of teachers who used ARIS in the 2010-2011 school year were designated the role of School Educator, which only gave them access to information about the students in their classrooms. The other 17,344 teachers were designated ARIS roles that gave them broader, school-wide access that was similar to that of administrators. These roles were listed in the ARIS usage file as Data Specialists, School Inquiry Team Member and School Wide Student Data Viewer.[xiv]

Based on the role indicator, ARIS use varied dramatically depending on an individual's level of access. As Figure 6 on the next page shows, a little more than half of all administrators and 45 percent of teachers with school-wide access to ARIS used the system the most. These users logged on to the system an average of 59 times during the year, accumulating nearly five and a half hours of usage each. In contrast, only about 22 percent of teachers with just classroom level access were heavy users. Slightly higher were other users with school-wide access, which included guidance counselors, administrative assistants and other support staff. Finally, a very small percentage of staff with access to only aggregate data (school-level summaries) were heavy users (see Table A3 in Appendix A for more details).

Figure 6
Percent of Educators Who Were Heavy ARIS Users
By Job Category and Level of Access



Source: 2010-2011 ARIS (clickstream) records and HR data provided by the DOE.
Notes: "Heavy" users accumulated a minimum of 90 minutes of ARIS usage during the year. The "Other" job category includes counselors, administrative assistants, and support staff. Users with school-wide access can view information for all students in a school. Users with only classroom access can view information only for students enrolled in a particular class. All users with just aggregate access can view only data summarized at the school level.

These data suggest that the more robust use of ARIS in schools is being performed by staff whose roles go beyond the classroom and involve more school-wide planning and coordinating. This is certainly true for administrators, who have default school-wide roles, but also appears to be true for teachers who have been designated specific school-wide activities, like leading inquiry teams, providing data expertise or coaching and mentoring.

One challenge to interpreting these results is the fact that our HR data does not provide verification as to whether the roles assigned in ARIS are consistent with actual teacher assignments or duties. We know from the interviews and focus groups we conducted in middle schools that principals assign school-wide access to some teachers for the sake of expediency or convenience. The default ARIS access for a teacher is to the students in the class that the teacher is associated with in one of the key source systems (ATS for elementary schools or STARS for middle and high schools). Due to constraints in these source systems, however, a teacher cannot be automatically associated with more than one class of students. For example, a middle school 6th grade math teacher does not automatically have access to the, say, four classes of 6th grade

students that she teaches. Rather, she only has access to one of those classes that is assigned to her in STARS as her "official class." To get access to data for students in the other three classes, she would need to request it from the teachers assigned to those classes (as their "official class"). A much easier solution is for the principal to simply grant each teacher an increased level of access by changing their ARIS role (for example, from School Educator to Data Specialist). This fact raises questions about the validity of the school-wide roles assigned in ARIS (and whether all the staff listed as Data Specialists, for example, are really performing that role).

Which Schools Used ARIS?

A final factor that might influence educators' use of ARIS is the type of school in which they teach. In theory, ARIS offers data and tools for all types of schools, from the periodic assessment data, which is used primarily in elementary and middle schools, to the transcript and scheduling data that is relevant for middle and high schools. Yet schools vary on a number of levels, starting with the grades they teach but also including the assessments they administer and their structures and schedules. Some schools may have more or less access to competing data systems, or to training on ARIS; some may find the data in ARIS more or less useful.

To explore this issue, we examined the clickstream data for teachers and administrators in elementary, middle and high school (as well as various other, less common school types) to discern whether they showed different patterns of use. This information is also valuable as context for the next chapter, which focuses on educators' perceptions of ARIS within one subset of schools: middle schools. Our analyses revealed that that:

ARIS use varied considerably across school types, with generally more robust use in middle schools.

Overall, about 25,000, or over a third of all ARIS users in 2010-2011, were located in elementary schools serving students in grades K-5/6, compared to about 13,000 users in high schools and 11,000 in middle schools serving students in grades 6-8. (See Table 5 on the next page.) The rest of the users were located in elementary-middle (K-8) schools, special education (District 75) schools that serve students with severe cognitive disabilities, and schools with other unique grade configurations (for example, pre-K to 2/3 and grades 6-12). There were also a much smaller number of ARIS users working in the city's alternative schools.

Table 5
Total Sessions and Duration By School Type, 2010-2011

Measures		All Schools	Elementary Schools	Middle Schools	Elementary-Middle Schools	High Schools	Other Grade Configurations	Special Education Schools	Alternative Schools
Sessions									
	Total sessions	1,258,928	454,622	304,029	152,693	273,273	62,371	7,892	4,048
	Sessions per user	21.0	18.5	26.8	21.7	21.4	22.9	6.1	15.0
Duration									
	Total hours	97,835	32,841	23,892	11,911	23,264	5,312	315	300
	Minutes per user	97.9	80.3	126.5	101.5	109.3	116.8	14.5	66.8
Number of Users**		59,986	24,545	11,333	7,042	12,768	2,729	1,300	269

Source: 2010-2011 ARIS (clickstream) records and HR data provided by the DOE.

Notes: School Type based on grade configurations. Elementary Schools (grades K-5/6); Middle Schools (grades 6-8); Elementary-Middle Schools (grades K-8); Other grade configurations (grades Pk-2/3, 6-12); Special Education Schools in (D75); Alternative Schools in (D79).

**Total excludes users whose school level could not be identified by either HR or ARIS usage files.

ARIS users in elementary schools conducted a third of all ARIS sessions during the 2010-2011 school year, while middle school users were next with a quarter of all sessions and high schools with about a fifth of all sessions. These figures, however, are skewed by the great disparities in the number of schools serving different grade configurations. About half of all public schools in New York City serve students in grades K-5/6 (about 800), while only one fifth (about 360) serve middle grades students and a little less than a quarter serve high school students (about 375).[xv] Thus, to get a more accurate picture of how usage varies by school type, it was important to look at how much individuals within schools were using ARIS.

This kind of per-user analysis showed that educators in middle schools accessed ARIS much more than those in other school types. On average, ARIS users in middle schools conducted about 27 sessions in 2010-2011, compared to users in high schools (about 21 sessions) and users in elementary schools (only 18.5 sessions). A look at the number of hours on ARIS reveals a similar pattern: Middle school users were on the system for an average of 126.5 minutes during the year, compared to 109.3 minutes in high schools and 80.3 minutes in elementary schools. Usage in K-8 schools was between middle and high schools.

Our analysis also discovered interesting patterns of ARIS use in schools with less traditional settings. Although the small number of schools in the "other" category (grade spans Pre-K to 2/3 and 6-12) had very few users overall (only about 2,700 users, conducting a little more than 62,000 sessions), on a per-user level, they showed quite robust use. With 23 sessions and about 117 minutes per user, they were second only to middle schools on average use per person.

When we disaggregated the usage analysis by the ARIS Data and Connect components of the system (see Table A4 in Appendix A), we saw some variation in usage patterns. On average, users in middle schools accessed the ARIS Data area for about 108 minutes, which was similar to high school users (a little over an hour and a half), yet much more than elementary school users (about an hour). Within the Data area, users in high schools were much more likely to use the Individual Student Profiles and the Views less so, while the opposite was true for middle, elementary and K-8 schools. The schools in the "other" category showed high per-user time in the ARIS Data area.

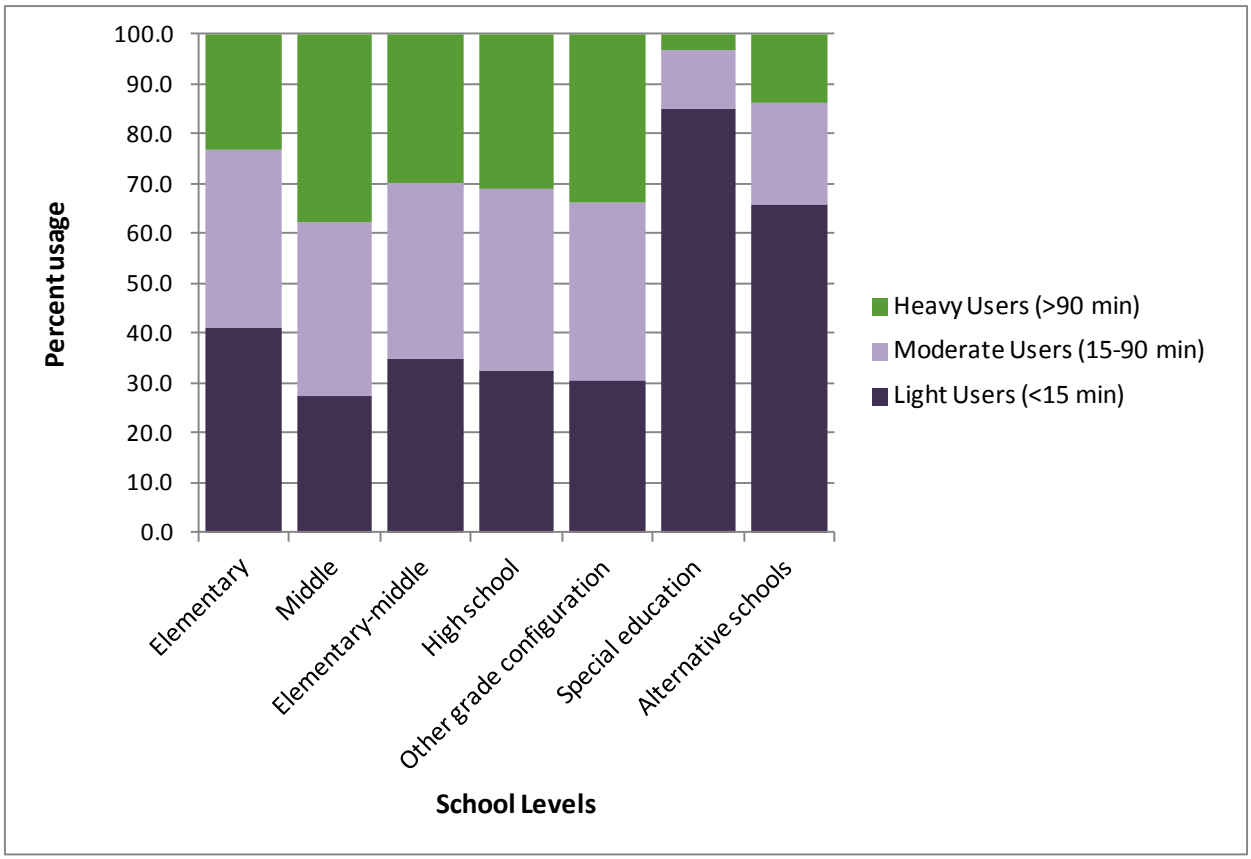
None of the different school types demonstrated much use of ARIS Reports (that is, the analytical tools that allow users to compare subgroups and run more complex statistical analyses). Elementary, middle, K-8 and schools in the "other" category all hovered around 5 to 7 minutes per user, on average, with relatively more use in middle and K-8 schools. In high schools, users spent only about 3.5 minutes using Reports, which was half of the 7 minutes per user in middle schools. All schools spent about 15 percent of their time on ARIS navigating the system.

A different hierarchy emerged when we examined the use of ARIS Connect. Elementary-middle (K-8) schools and elementary schools (K-5/6) showed the most use of this tool, with an

average of 22 and 21 minutes per user, respectively. Users in middle schools accessed ARIS Connect much less, with only 18 minutes per user, while users in high schools only logged on to this area for about 12 minutes per user throughout the year.

Finally, we examined the concentration of user types in different categories of schools and found on average more heavy users in middle schools. Around 38 percent of all ARIS users in middle schools are heavy users, compared with 30 percent in high schools and 23 percent in elementary schools (see Figure 7). Schools in the "other" category, which represent a much smaller group of schools and users, were closer to middle schools, with 33 percent of their staff in the heavy category. Special education schools and alternative schools had the highest concentrations of light users.

Figure 7
Frequency of Use by School Type



Source: DOE HR and ARIS usage files for the school year 2010-2011.
Notes: School Type based on grade configurations: Elementary schools (grades K-5/6); middle schools (grades 6-8); elementary-middle Schools (grades K-8); other grade configurations (grades Pk-2/3, 6-12); Special Education schools (D75); alternative schools (D79). Analysis excludes ARIS users whose school type could not be identified by either HR or ARIS usage files.

Our analysis demonstrates that different types of schools, serving different grades and categories of students, varied in their use of ARIS. While middle school educators used ARIS the most, their activities were focused on the ARIS Data area and much less so on Connect. High

school educators also showed relatively higher ARIS Data use and even lower Connect use. In contrast, elementary school users accessed ARIS Data less, but were much more likely to use ARIS Connect. Finally, the small number of schools in the "other" category (with alternative grade configurations) showed surprisingly high ARIS use.

Summary

Our analyses of ARIS's clickstream data showed that a substantial portion of New York City's educators—nearly three quarters of them—used the system in 2010-2011. Individual usage varied considerably, in terms of the number and length of sessions. On average, educators logged on 21 times throughout the year, for about five minutes per session.

ARIS Data was the most commonly used section of the system, particularly the Views and Individual Profiles areas, which display information about classes and individual students, respectively. Educators were much less likely to use the system's more advanced reporting tools or the Connect area, where they can share resources or communicate with other educators.

ARIS was used throughout the year, peaking in the early months of the school calendar. The system's heaviest users accounted for the vast majority of sessions and time, though the kind of material they accessed did not vary significantly from that of light and moderate users. Teachers with roles that gave them school-wide access to ARIS were much more likely than regular classroom teachers to be heavy users, as were administrators (who all have school-wide access). ARIS use varied across different types of schools, with generally higher use among educators in 6-8 middle schools.

V. EDUCATOR PERCEPTIONS OF ARIS

Clickstream data provide a rich picture of how and how much ARIS is being used but tell us very little about educators' experiences with the system. Thus, our study also set out to illuminate educators' perceptions of ARIS. What do they see as the system's main strengths and limitations? What enhancements and supports do educators believe would make ARIS more useful?

There were two main sources of data for this part of our study: A survey of teachers in 23 middle schools, as well as interviews with administrators and focus groups with teachers, conducted in a subset of 10 of these schools. As discussed in Chapter III, we wanted to select a group of "like" schools for the surveys and fieldwork (elementary, middle and high schools have different kinds of data, different structures, calendars, etc., which would have made it difficult to analyze the survey and fieldwork data across school types). We decided to focus on middle schools. Thus, while the teachers' responses to the survey are representative of middle schools broadly in New York City, they cannot necessarily be generalized to other types of schools. Furthermore, the interviews with administrators and focus groups of teachers were done in schools that demonstrated high ARIS usage, relative to all other middle schools in the district.

Despite these limitations, both sources of data provide vital information that would have been impossible to glean from clickstream data alone. Educators' perceptions of ARIS provide valuable context for interpreting the usage data and point toward concrete improvements that might make the system more useful and effective.

The Teachers We Surveyed

In Spring 2011, we surveyed more than 600 teachers across 23 middle schools, which our analysis have shown to be representative of the City's nearly 250 grade 6-8 schools. The majority of survey respondents (53 percent) taught either math or ELA, the two focal subjects for New York state tests and accountability system. Almost a third reported teaching science or social studies, 19 percent taught special education or ELL students, and 18 percent of respondents reported "other," which included teaching in the arts, physical education, and working in guidance, etc.

We also asked respondents to indicate whether their position explicitly involved using data. Overall, 45 percent of respondents selected one or more data-related position, including inquiry team member (44 percent), data specialist (5 percent), testing coordinator (5 percent) and "other" (11 percent). Respondents also represented a broad spectrum in terms of teaching experience, with a majority (65 percent) having taught between 4 and 15 years.

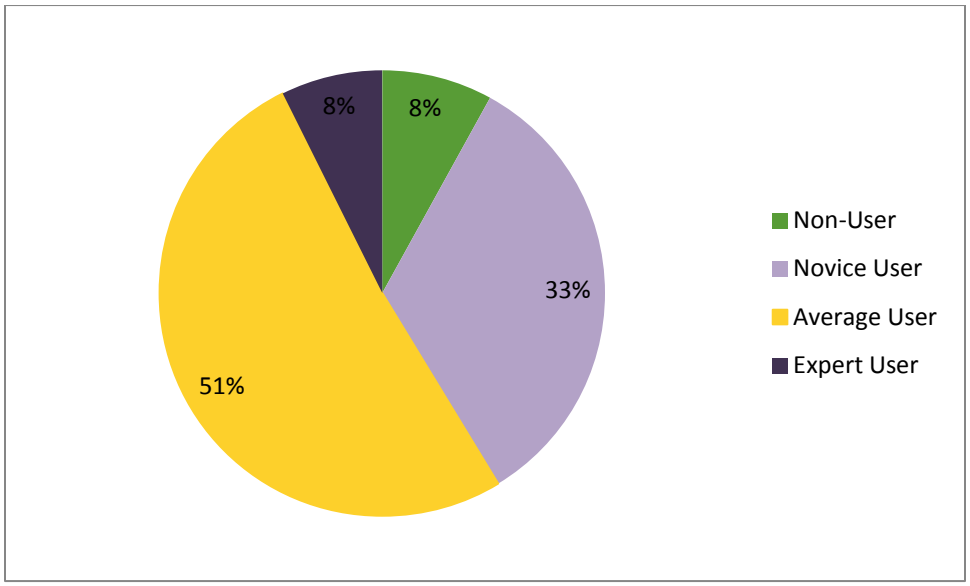
How Comfortable Do Educators Feel with ARIS?

Users' sense of comfort with a technology system is one way of understanding its utility. If they feel confused about a system's features or unsure how to "make it work," they are unlikely to benefit from it. Conversely, if many users come to feel proficient with a system, this is an indication that, in some basic way, the system is meeting their needs.

By and large, middle school teachers perceived themselves to be average users of ARIS.

As Figure 8 shows, 51 percent of the teachers we surveyed across 23 middle schools referred to themselves as average users. Very few considered themselves to be either non-users or experts (8 percent each), and about one third responded that they were novice users. The low number of teachers considering themselves non-users is consistent with our clickstream analysis, which showed that the vast majority of the City's educators have used the system at least once (with heavier use in middle schools, compared with other school types).

Figure 8
User Perceptions of ARIS Skill Level



Source: Research Alliance survey of middle school teachers, Spring 2011.

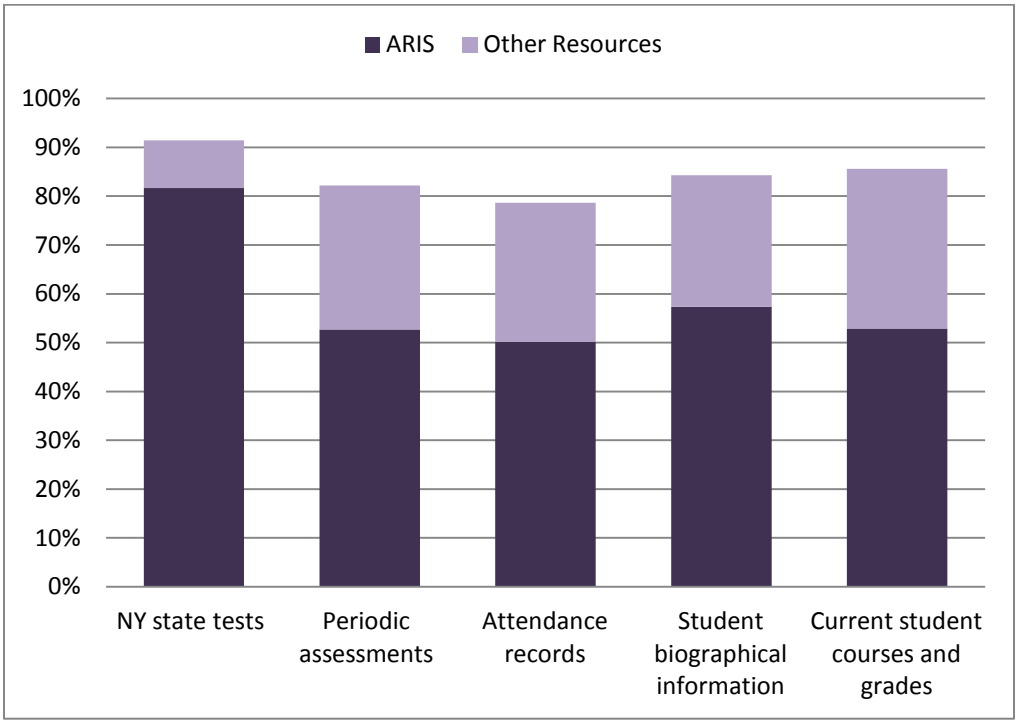
What Are ARIS's Strengths?

The educators we surveyed and spoke with highlighted a number of ways that ARIS has been successful, including becoming the primary source for important information, centralizing data in one convenient place, and resolving early technology issues. Understanding—and building on—these strengths will be critical for ARIS moving forward and, potentially, for the development of other similar data systems.

For most teachers we surveyed, ARIS was the primary source for assessment and other student data.

Our surveys showed that most middle school teachers go to ARIS for key student information. Figure 9 shows the percent of respondents who use ARIS or another resource for New York State test results, periodic assessment scores, attendance records, student biographic information, and current courses and grades.

Figure 9
Primary Resource Teachers Use to Access Information



Source: Research Alliance survey of middle school teachers, Spring 2011.
Note: The totals do not add up to 100 percent because we excluded those who responded, "I do not use this information" and multiple responses.

In the case of the New York State test scores, an overwhelming majority of respondents—80 percent—use ARIS to access this information, while less than 10 percent use an alternative source. About half of all respondents also accessed ARIS for periodic assessment, attendance, biographical and course and grade information. Only around 30 percent used an

alternative source for these data. Alternatives include paper reports provided by school administrators or, in a smaller number of cases, alternative web-based systems that provide scheduling and grading information. For periodic assessment data, there is an alternative web portal provided by the assessment vendor, CTB McGraw Hill, for their Acuity tests, which most middle schools use. The Acuity portal provides more detailed information than the summary scores that are available in ARIS. The Acuity portal can be accessed from ARIS, although the ARIS clickstream records do not capture the amount of time ARIS users spend on the Acuity site. Nonetheless, it is noteworthy that the majority of teachers cite ARIS as the primary source of information about periodic assessments, rather than other sources like the Acuity website.

The responses that we heard during our interviews and focus groups in 10 high-usage middle school seem to confirm the perception that ARIS has become a standard tool. In our focus groups, teachers frequently mentioned how they used ARIS to familiarize themselves with the basic performance data and other indicators for their students. The most common area they accessed on ARIS was the Data area, and in particular, the My Students Tab, where they viewed student performance and attendance information and information on whether students were ELL, former ELL, or had an Individual Education Plan (IEP). The teachers mentioned that this information was especially useful at the beginning of the year. As one teacher explained:

> *We all use ARIS. It's a tremendous asset to us all because it gives us a head start... [ARIS provides] some initial data, hard data, that we can use to determine the strengths and weaknesses of children. Also, we can see report card grades and attendance issues… It gives us a good blueprint about the student.*

Other teachers echoed this sentiment, making it clear that ARIS is their primary source for basic kinds of information about students.

ARIS has become a convenient "single stop" source for information, particularly for school-wide planning.

ARIS was also perceived by school staff as a tool that was convenient as a "one stop shop" for key student data. Before ARIS, educators had access to much of the same data—such as test scores, attendance records, and parent contact information—but had to go to multiple sources to get it. As one administrator pointed out, "I use ARIS basically as a gathering point for all the data that I [use]. In previous years, test scores and test history—that was all always available. ARIS just makes it easier and faster to get it."

We also heard in our fieldwork that ARIS is used frequently for planning purposes. Administrators in these middle schools explained how they used ARIS for making school-wide decisions. For example, two principals mentioned using ARIS data to target professional development, based on where they saw weaknesses, and to make decisions about what types of afterschool supports would be most beneficial for students. Data specialists explained how they looked at entire grade levels in ARIS to figure out the best way to provide professional development for groups of teachers. In addition, multiple inquiry team members described how

they use ARIS not only for their individual classes but also as a launching point for inquiry team discussions. As one data specialist explained:

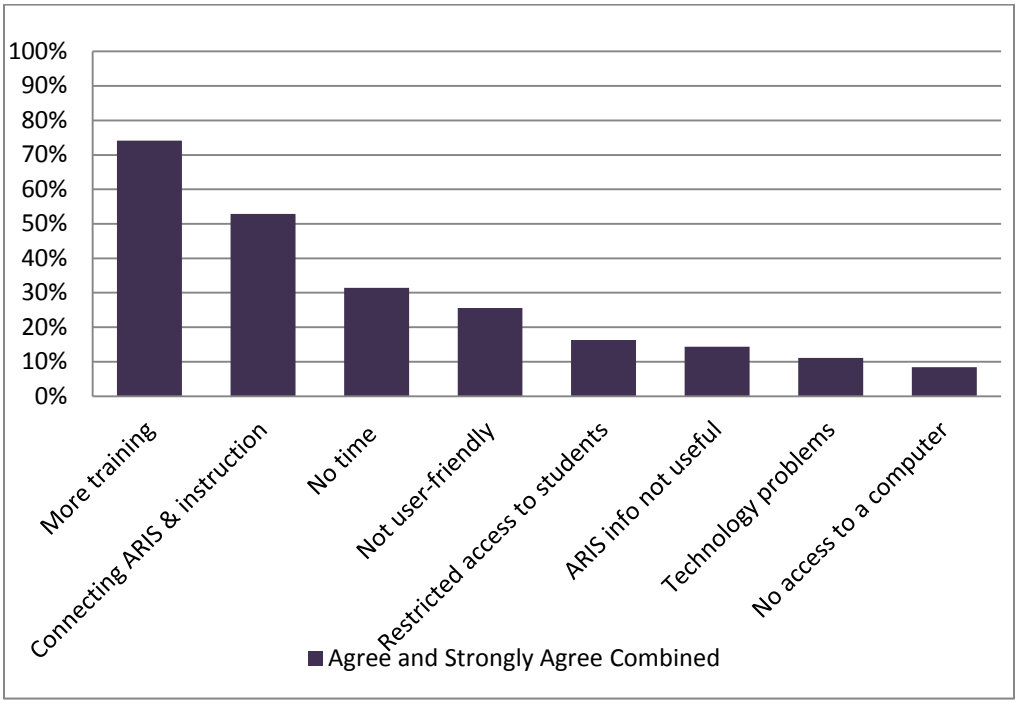
> *We're looking at data in a very, very different way [than classroom teachers]. … [ARIS] is good for administrators. It's good for high-end users who are going to look at whole grades, whole schools, compared to over time, over different measures.*

This finding is consistent with our analysis of clickstream data, which showed higher ARIS usage by both administrators and teachers with school-level access. These are the staff using ARIS the most, for more high-level planning and administrative purposes.

Technological issues were not a major barrier to using ARIS.

The key barriers to using ARIS, we discovered, were less about technological issues and more about training and making sense of the data (which we discuss in more detail below). As Figure 10 demonstrates, very few middle school teachers agreed or strongly agreed that access to a computer or technological problems limited their use of ARIS. In addition, less than 15 percent of the respondents agreed or strongly agreed that ARIS is simply "not useful at all." This appears to contradict earlier reports when the system was first rolled out in 2008. At that time, the media reported complaints from principals who said that the system ran slowly, "[lacked] vital information, and is often too frustrating to use" (Gonen, 2008). Conversely, most of our respondents seem satisfied with the technical aspects of ARIS. The exception, as we discuss later in this chapter, is the ARIS Reports tool, where teachers report significant technological and other problems.

Figure 10: Potential Barriers to Using ARIS



Source: Research Alliance survey of middle school teachers, Spring 2011.

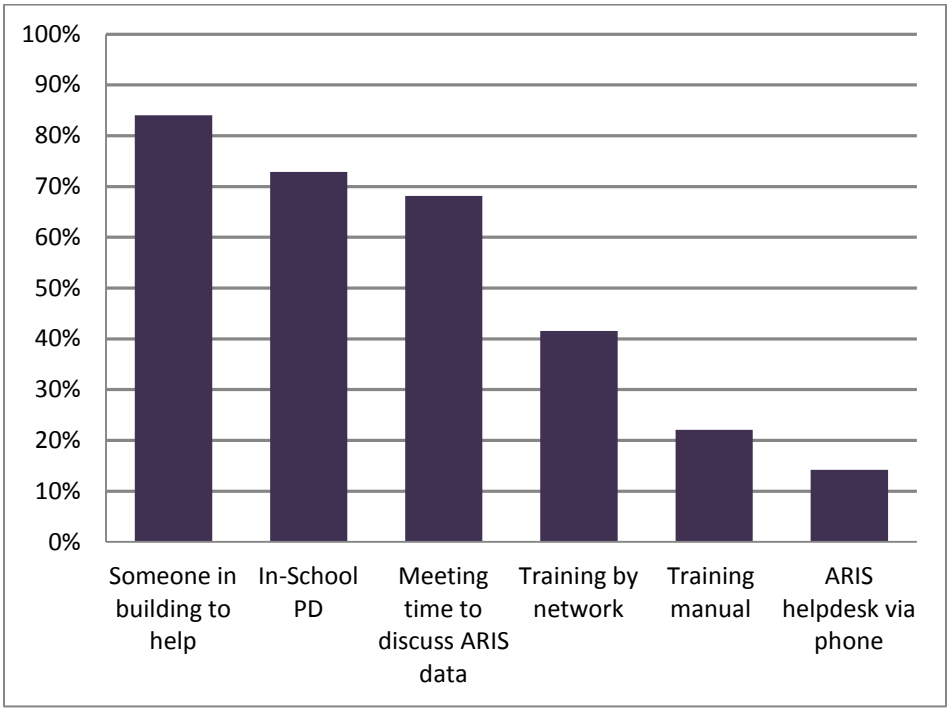
What Are the System's Limitations?

Educators reported a number of challenges in their efforts to use ARIS. Among these were a lack of training and support, data that are updated infrequently and are not seen as useful for day-to-day classroom instruction, and specific tools (Reports and the ARIS Connect Area) that are perceived as difficult and not particularly relevant to teachers' needs.

Educators saw a lack of training as a significant barrier to use.

The teachers we spoke with felt that a lack of training impaired their ability to use ARIS effectively. Well over 70 percent agreed or strongly agreed that they needed more training in ARIS (Figure 10 above). In a separate question on the survey, respondents reported receiving training and support in a variety of ways since ARIS was rolled out in 2008 (Figure 11), most frequently in the form of in-school supports, such as someone in the building to help (84 percent), professional development (73 percent), and time in meetings to discuss ARIS data (68 percent). Lower frequency trainings and supports included training by their network (42 percent), using a training manual (22 percent), and using the ARIS helpdesk via phone (14 percent).

Figure 11
ARIS Training and Support



Source: Research Alliance survey of middle school teachers, Spring 2011.

The survey results indicate that when teachers need training or want help with something ARIS-related, they go to someone in their building and rarely use centrally located services like the helpdesk or their network support system. While we did not provide an opportunity for respondents to select whether they had received training outside of their buildings since the

rollout of ARIS, we learned from our fieldwork that much of the training is turn-keyed, where one or two staff are sent for training and then return to the building to disseminate the lesson learned. This method would thus be captured in the "someone in the building to help" category.

One of the concerns we heard about the way training in ARIS has been rolled out is that the focus on turn-key training has created uneven expertise in the tool. As one Assistant Principal described it:

> *Because there's so many newly added features, we've kind of been exploring it on our own, and I think that we're missing a lot of what's there because they haven't really received training from someone who's really an expert at all of it… [T]here's not one or two people in the building that [have] the whole package.*

Based on our site visits, we learned that training on ARIS seemed to have occurred primarily during the first rollout in 2008 with few follow-up efforts. There was, however, a range of training experiences in the 10 schools we visited. Some teachers explained that they had training when new features were introduced. Others said that they had received no training since 2008. For those who did receive new training, it was primarily delivered in the aforementioned turn-key method from other staff in their building. Direct, out-of-school trainings appeared to be rare in the schools we visited, at least during the 2010-2011 school year. That said, at one school we visited, the principal mentioned paying for substitutes so all the teachers in the school could go to training throughout the school year.

We heard on a number of our visits to the 10 high-usage schools that use of different features in ARIS was directly related to the amount of training educators had received. In other words, without more and better training, many of the tools on ARIS are left unused. For example, one teacher explained her use of Connect as it related to the amount of support she had received:

> *I think that activity has been limited, because for little knowledge of how else we could use it or how we could interact with it with different colleagues…[W]e see the options that are there for blogging and chatting and sharing information, but I don't really know how to use that very well.*

Another teacher at the same school reported:

> *I think teachers are good with test scores and attendance and contact information. I think it would take more than a PD to be shown the usefulness of other components… Like, I think right now, it feels like we have so many better ways of doing some of the things that it does.*

Finally, in some cases, the lack of training has led to frustration and dismissal of certain tools all together. This teacher described a loop of lack of support, no longer seeking out help, and mostly avoiding the features that she didn't understand:

…I use the features I know, and anything else I just don't use….anything that requires me to think and, "oh, I have to figure this out," I'll just end up saying "I'll get to it later" and I don't...

We have no causal evidence to suggest that the quantity or quality of training has had an impact on the actual use of ARIS. However, the survey and interview responses do suggest that teachers in middle schools perceive the current quality and frequency of ARIS training as a limitation in their capacity to become fully engaged with the system.

Teachers found the data in ARIS unhelpful for day-to-day instruction.

Not knowing what to do with the data was the second highest obstacle to using ARIS effectively, as reported by middle school teachers in the survey. Over half of all the teachers we surveyed agreed or strongly agreed that they needed help using the data from ARIS to improve their instruction. This finding is, in part, a reflection of the kind of data available in ARIS: The information does not change frequently and, thus, is limited in its capacity to inform daily or even weekly/monthly instructional practices. Though the periodic assessment data in ARIS does change at least three times during the year, as mentioned earlier, these results are provided in much more detail on a separate website. Furthermore, teachers reported in the focus groups that summary scores were often not posted in ARIS until many weeks after the assessment had been administered, when, in the view of many people we interviewed, it had become outdated.

While respondents frequently remarked that ARIS provided an unprecedented amount of data to teachers, this information was not seen as directly useful or adequate for instruction. As one teacher explained, plainly:

…right now I just use it sort of for, like, paperwork or calling parents…. I'm not going to go to ARIS except in the beginning of the year when I want to know their test scores. That's it. Throughout the year I'm not going to really use it to differentiate, to pull data from. There's nothing there for me…

The static nature of the data on ARIS does not appear to fit with the instructional needs of teachers, who require more real-time information to inform their practice. Most of the information that is provided through ARIS is loaded into the system at the beginning of the year and does not change. Exceptions to this are attendance data, periodic assessments, and high school course credit information. Even these data, however, are updated infrequently—on roughly a per-semester basis. As a result, some schools have developed their own systems for tracking student performance more regularly. For example, in addition to, or in lieu of Acuity or other periodic assessments, some schools in the interview sample create their own benchmark assessments that they have been using for years, but which are not reported on ARIS. As one teacher explained, "We have ongoing assessments. We have observations of student activity in the classroom, which give us a better sense than just what concrete test score type data would give us."

The more complex analytical and knowledge management functions in ARIS were perceived as difficult to use and not closely related to instructional practice.

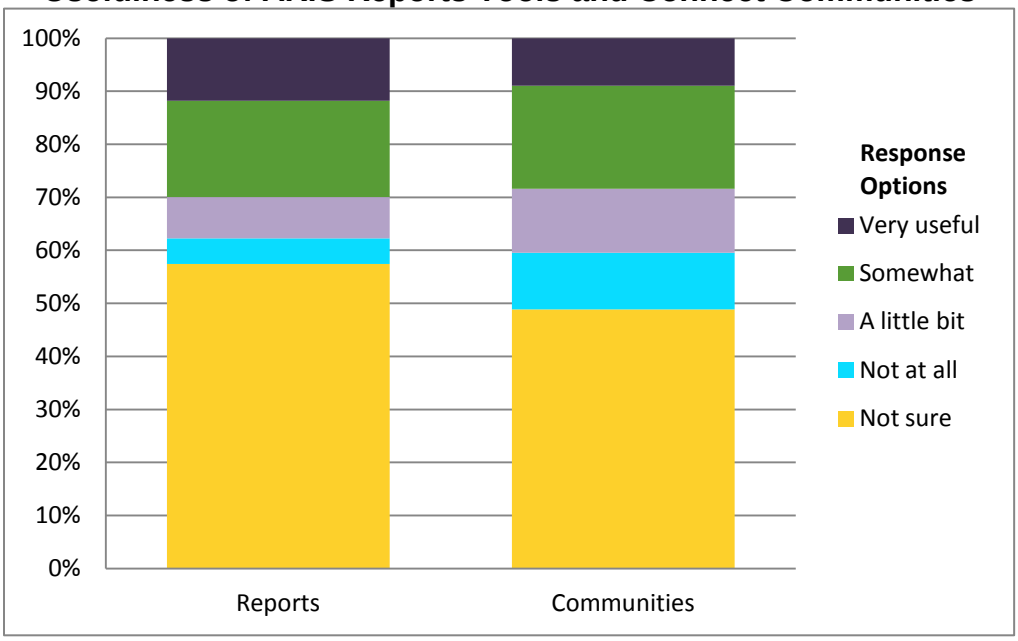
As our analysis of clickstream data illustrated, the ARIS Connect feature is used much less than the ARIS Data area. Moreover, within the ARIS Data area, the Reports function, which provides analytic tools to compare subgroups of students and conduct more complex statistical analyses, is used much less than Views and Individual Student Profiles. The usage data showed that only 20 percent of all ARIS use involved Connect and only 5 percent involved Reports. Through our interviews and surveys, we learned that ARIS Connect and Reports, while holding great potential for communication and analysis, were largely seen as difficult to use and/or not connected to the day-to-day work of teachers and administrators.

The survey asked respondents to rate the usefulness of ARIS Reports and Connect Communities on a 4-point scale from "not at all useful" to "very useful." We also included a "not sure" category for respondents who had little to no knowledge of ARIS and these tools. Overall, as seen in Figure 12 on the next page, we found that half of the teachers we surveyed (49 percent) were "not sure" about the usefulness of the features in Connect Communities. An even greater proportion of these teachers (57 percent) felt the same about ARIS Reports. This suggests that these users were either not aware of these tools or knew they existed but simply had not used them. When the "not sure" responses were combined with "not at all useful" (the two bottom sections in Figure 12), a clear majority of respondents expressed uncertain or negative views about the utility of the Reports and Connect Communities.

About 30 percent of the respondents found both Reports and Connect Communities to be "somewhat" or "very" useful. This finding is slightly inconsistent with what we found in the clickstream analysis, where we saw very little usage for both Connect and Reports. It is possible that respondents were thinking more about the potential of these tools, rather than the way they actually use them in their teaching. With regard to Reports, it is also possible that they were confusing this feature with the other reporting tools found on Views.

In our interviews and focus groups in the 10 high-usage schools, we learned that the largest impediment to using Reports was its interface, which teachers described as complicated and slow. In fact, teachers explained that if Reports did not take so long to run, they would probably take the time to understand the tool, but given its sluggishness, some teachers entirely abandoned the feature. As one teacher explained, "…It would be great if it was instantaneous. I would spend more time to be more proficient on it, but to run one report it takes forever, so I don't even really bother trying to use it."

Figure 12
Usefulness of ARIS Reports Tools and Connect Communities



Source: Research Alliance survey of middle school teachers, Spring 2011.

Given these limitations, teachers and administrators described using other tools to do analytic work, particularly Excel. The data specialist at one school explained:

> *I use ARIS almost every day in some form or function… but honestly the Report function, I don't use it. It stinks. It's not user-friendly. It doesn't help me, so I basically download the data and create my own graphs. The graphs [on ARIS] aren't user-friendly for the teachers. The little line charts that it creates, most of the teachers were like, "What is this?" It doesn't print in a usable fashion, so if we do charts or .gif reports, the teachers prefer it in the Excel document... Excel has an interface that many are familiar with…*

Similarly, educators were not sure what they could gain from using ARIS Connect. It was common to hear that the sole use of Connect, if any at all, was to support the school inquiry teams. Principals and other administrators mentioned providing templates for inquiry groups to record on Connect what was discussed. These same principals also mentioned checking on the inquiry spaces on Connect to follow the progress of the inquiry meetings.

We also heard about a few technical challenges in using Connect, in particular because there were multiple steps to upload a document, including classifying its document type or specifying who could read the post. In our interviews and focus groups in the high-usage schools, there also appeared to be reservations regarding the use of web-based forms of communication, as opposed to simply walking down the hall and speaking with colleagues. One teacher even mentioned discomfort interacting with "strangers" on Connect: "I don't know what

the community function is supposed to be. I guess I'm supposed to connect with other math teachers…But in real life, it's not going to happen."

These findings highlight some of the possible reasons for the low usage of ARIS's Connect and Reports features that we saw in our clickstream analysis. Overall, teachers perceive these tools as both difficult to use and not directly aligned with their practice or instructional needs in the classroom. While Connect appears to offer the capacity for a greater flow and exchange of information between individuals within the district, there are challenges in aligning Connect with existing practices and styles of communication. The Reports tools also appear to offer potentially useful analytical power to educators in schools. However, even the data specialists, who in theory would have more time to use such tools, find it easier to simply download the data from ARIS and use Excel to manipulate and report out the information.

What Enhancements and Supports Would Make ARIS More Useful?

Our surveys, focus groups and interviews pointed to several potential strategies to overcome the perceived limitations of ARIS and make the system more useful. Not surprisingly, these include improving and expanding ARIS's content, creating more dedicated time to learn about and use ARIS, and improving training and support.

The content in ARIS could be improved.

One of the central concerns we heard in our fieldwork was about the limitations of the data in ARIS, particularly the lack of real-time data. In addition, we heard concerns about the fact that the data is heavily focused on student achievement and demographics and lacks detailed information on other important indicators, such as student behavior and specific IEP information. In one school we visited, where the administrators placed considerable emphasis on managing student behavior, they lamented the lack of access to real-time incident reporting on ARIS. To fill this gap, they had created a daily reporting system in Excel to document classroom disturbances and shared the information with all staff using Google documents.

Another criticism we heard in our fieldwork was about the inability to use ARIS to provide anecdotal information about students. A principal at one school shared this view:

> *You know, [a] child has a [level] one this year, had a one last year, [and] doesn't want to come to extended day. …Currently, they've missed five homeworks [sic]… [T]hat's where the hole is [in ARIS], because you need that fluid information that it doesn't give you.*

Another principal highlighted the need for better information about family circumstances that are likely to affect students' engagement and performance and that could equip schools to offer more effective supports:

> *The things that ARIS doesn't tell us is did a kid have breakfast that morning? Has a kid been in a shelter for the last three weeks and moved to a new shelter? Did a kid get into*

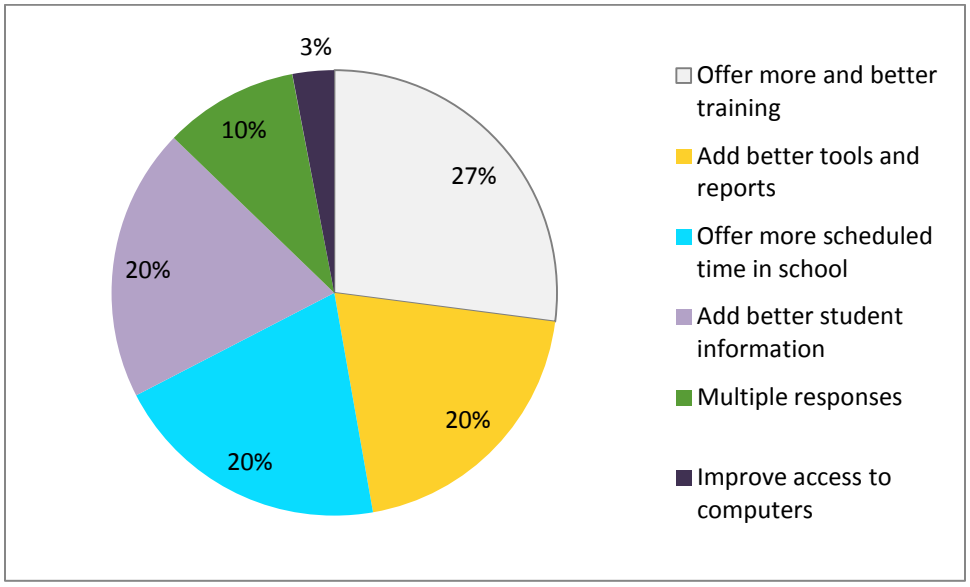
fight with his brother? That kind of stuff, which I think is incredibly important in terms of the daily dynamics and operations of a school like this… It's about seeing the kids in action.

Overall, the educators we spoke with wanted better and different kinds of data in ARIS, including more regular, real-time assessment data that they can use to inform their instruction, as well as non-academic information, such as updates on student behavior and detailed information from IEPs (for students with special needs). Teachers also said they would appreciate the opportunity to input data (not simply consume it).

Educators may benefit from dedicated time to use ARIS.

Our findings about whether educators have sufficient time to use ARIS were somewhat mixed. Responses to the survey suggested that time constraints were not the primary barrier to using ARIS. As we showed in Figure 10 above, over two thirds of the middle school teachers we surveyed (69 percent) disagreed with the statement that they have "no time" to use ARIS. On another item in the survey, we asked respondents to identify a preference for a hypothetical change that would make ARIS more useful. Out of a choice of five changes, just 20 percent selected "more scheduled time in school" as the most essential change (see Figure 13).

Figure 13
One Change to Make ARIS More Useful



Source: Research Alliance survey of middle school teachers, Spring 2011.

However, during our site visits, we got a much more nuanced picture about the relationship between time and ARIS use. Some teachers seemed not to have any issues using ARIS when they needed it, but others mentioned not being able to squeeze it in during busy days. Not surprisingly, we heard on a number of our visits to the 10 high-usage schools that there are many things that require time and attention during the school day, and consequently ARIS

tended to fall by the wayside. As one teacher described, ARIS represented more extra work rather than a tool to increase efficiency:

> *Make it easy. Make it really well-integrated with what a teacher actually does during the day, which, contrary to what [the central office] thinks, I don't spend all day looking at data. I mean not formal data that they want me to look at. I spend most of my day planning out lessons, setting up, reviewing what the kids are doing, looking at student work, fine. But I don't have another 45 minutes in my day to pore through more stuff.*

Another common theme was the need for more time to explore ARIS and its various tools, particularly those that weren't covered in training. A literacy coach explained how complicated she found Reports but conceded that, with additional time, she might use it more:

> *It probably would take a lot of time, I think, for me to understand it. I would have to play around with it to really get to what I want but time around here is… a precious resource.*

Building a structure around ARIS use, we also discovered, was largely driven by individual school leader's decisions. Given that time is a precious resource in all schools, one of the more interesting discoveries during our site visits was how schools sought out creative ways to make time for staff to review and discuss data, whether it came from ARIS or other sources. For example, a few of the schools we visited exercised a School-Based Option (SBO), a public vote that enabled the school to make changes in the contractual way time is structured for teachers. The SBOs allowed, for example, principals to use time reserved for tutoring to meet and plan during and after the school day. As some administrators explained to us, it was only with the SBO that they were able to carve out needed time for their staff to meet and talk about data.

Educators need more and better training in ARIS.

As noted above, lack of training was a central theme that emerged from the survey (see Figures 10 and 13) and fieldwork. When asked what they saw as the most important change to make ARIS more useful, the most common response was more training. Even educators who described themselves as "average" users in our interviews wanted more follow-up training, especially training that contained new information and that was more hands-on.

We heard from multiple teachers that they wanted more training in ARIS's analytic functions, particularly the Reports area. Respondents were also quite insistent about wanting opportunities to try the system directly during the trainings. One assistant principal described the type of training she had received from her network and the type of training that she would find more effective:

> *…[T]he person who's in charge of data in my CFN [Children First Network], all she does is copy and paste and send you the pictures that's on—like, in the help booklet in the ARIS—so if I went to ARIS help and they said, do this and do this, that's all she does… I*

think I learned my most effective lessons and implementations through sitting in workshops, hands on, with other people who are like me, that you can brainstorm with, not from a robot.

Several educators we spoke with called for trainings that are differentiated to meet the needs of users with varying levels of expertise. Such trainings could both acquaint new teachers to the system and enhance the work of those who were familiar with the standard functions in ARIS and ready to learn more.

Summary

The majority of the teachers we surveyed identified themselves as "average" users of ARIS. About a third said they were novice users, while very few considered themselves to be either non-users or experts. The survey and fieldwork surfaced several perceived strengths of the system, including that it has become the primary source for many kinds of data and is a convenient "single stop" for educators, particularly for school-wide planning purposes. It also seems that some early technology issues have been largely resolved.

Other issues remain as challenges for the educators in our study: They cite a lack of training and support, data limitations, and difficulties with specific tools (Reports and the ARIS Connect Area) as major barriers to using ARIS more effectively. These limitations align with educators' suggestions for how to improve ARIS, which include enhancing the content in the system, carving out more time to use the system and providing more and better training on the system.

These findings are, for the most part, consistent with what we saw in the clickstream analysis. Low traffic in the ARIS Reports and Connect areas corresponds with educators' perception of these tools as difficult and not useful. Heavier use of the ARIS Data area also makes sense, given that most educators say ARIS is their primary source for the information kept in that section of the system. Similarly, the fact that ARIS use was higher during the early months of the school year, when teachers were checking basic information about their new students and beginning to plan for the year, is consistent with both strengths (ARIS is a good single source for key data) and limitations (the data is static) revealed in our surveys and fieldwork.

The next chapter considers the implications of these findings. Taken together, what can the clickstream data, surveys and fieldwork tell us about whether or not ARIS is meeting its goals? What do they suggest about how to get the most out of ARIS and other such systems around the country?

V. DISCUSSION AND CONCLUSION

Whether or not ARIS has lived up to expectations has been the subject of intense debate. This study provides the first detailed, system-wide, empirical examination of ARIS usage, coupled with surveys, interviews and focus groups that illuminate educators' perceptions of the system. Based on these data and analyses, this chapter takes up the central question: Has ARIS achieved the goals that were set out for it as it was being developed and launched four years ago? Addressing this question directly is especially difficult given the wide range of ambitious goals and functions for which it was designed. To frame a useful answer, therefore, we revisit the three overarching ways that ARIS was expected to support New York City's education reform effort, first outlined in Chapter II. We then consider implications of these findings for future research and for the development of school data systems in New York and around the country.

Providing Data for School-Wide Planning and Accountability

As a tool for aggregating data from disparate systems, improving access to information and creating a convenient "single stop" resource for educators (particularly those with school-wide roles), ARIS has been successful on several counts. Most educators used the system in some way during the 2011-2012 year: About two thirds of teachers and an even greater proportion of administrators—94 percent of principals and 84 percent of assistant principals—logged onto ARIS at least once.

How much time educators spent on ARIS varied greatly, and the heavier users were clearly those whose roles extend beyond the classroom and into larger, school-wide planning. In all, just over 80 percent of all ARIS usage was accumulated by less that 30 percent of those who logged in to the system during the year. At the same time, about 95 percent of all New York City schools had at least one heavy ARIS user (averaging nearly 55 login sessions and four and a half hours on the system during the year) who played a school-wide role with the system.

The vast majority of time spent on ARIS focused on accessing basic student information in the ARIS Data section of the system. This is likely to be a function of the kind of data that is available in ARIS: information about state test scores, periodic assessments, attendance, grades, transcripts, etc., which can easily be viewed at the individual-student, classroom or school-wide level. These data are quite useful for administrators, data specialists, coaches and inquiry team members, who need to understand and track broad trends in student performance. For school-wide planning purposes and for monitoring a school's progress within the City's accountability system, ARIS gets high marks.

Supporting the School-Wide Inquiry Process

The developers of ARIS also hoped the system would support a school-wide inquiry process, helping foster a culture of lively data-driven discussion and decision-making. Our findings suggest that ARIS has only partially accomplished this goal. The clickstream analysis

showed that those with school-wide roles, including inquiry team members, are using ARIS heavily. In focus groups and interviews, teachers made it clear that they see ARIS as a valuable tool for the inquiry process—which allows them, as one said, "to look at whole grades, whole schools, compared to over time, over different measures."

Yet, in spite of these strengths, certain aspects of ARIS remain underused. ARIS's developers hoped that its complex analytic and knowledge management functions would be a boon to inquiry team members. But our analysis revealed that these functions—housed in the Reports and ARIS Connect areas—are used much less than the basic Data tools. Some educators told us that, rather than wrestling with Reports, they often download data from ARIS and then use other resources (e.g., Excel) to manipulate and present it to colleagues. And many teachers were skeptical about the utility of ARIS Connect for sharing knowledge and supporting their work.

It is unclear whether the lack of interest in the Reports and Connect functions reflects real limitations of these tools or is simply a result of inadequate training. Certainly, inquiry team members' heavy use of other parts of ARIS could provide a good foundation for more targeted training around the system's advanced features.

Empowering Teachers with Data to Inform Their Practice

A final goal of ARIS was to empower teachers by giving them access to critical student information that could help them improve classroom instruction. Teachers were expected to use these data to tailor their lessons and better meet the needs of individual students. ARIS has indeed provided teachers with an unprecedented amount of information about the students in their classes. In the past, teachers were forced to go to multiple sources for this information, and it is now at their fingertips, in a single, easy-to-access location. As a result, ARIS has become the main source of key student data for most teachers and a standard, if not essential, tool for beginning-of-the-year planning.

Despite this broad use, the findings from our study also suggest that ARIS has not been successful as a tool to inform day-to-day classroom instruction. By and large, teachers are not using the system to inform regular adjustments to their lesson plans or to tailor instruction to meet individual needs. The largely static data that can be found in ARIS are simply not useful for these purposes. State test scores are posted only once a year. Periodic assessment results are posted more frequently, but can be accessed in more detail on an alternative website. Attendance and high school course credit information is generally updated once per semester.

In response to these issues, the DOE is currently working to provide more real-time access to data, as part of an initiative they have termed ARIS-local. The centerpiece of this initiative is the Reading Tracker, which provides teachers with the capacity to upload and manipulate data from a series of common literacy assessments (DOE 2011). The tool is currently

being piloted in a few hundred schools and has the potential to offer teachers access to data they can use to monitor student progress on a more regular basis.

Another factor contributing to the limited use of ARIS is the way educators are trained on the system. For many, training has been limited to an early introduction to ARIS's basic features, with little follow-up support or guidance about how to use more advanced components or how to incorporate them into daily instruction. Better, more hands-on training might position teachers to use the system more effectively.

That said, it is unlikely that ARIS will be able to inform teachers' day-to-day instruction, as originally envisioned, unless significantly more real-time data is made available in the system. Furthermore, it is not clear whether teachers generally need the analytic features in the Reports section or the knowledge-sharing resources in ARIS Connect. More research would be needed to determine the true utility of these currently underused components of the system.

Next Steps

In many ways, school data systems are still in their infancy. This study produced valuable information about how one such system is being used and how it has been experienced by educators, three years into its implementation. The findings illuminate a number of successes, including aggregating an enormous amount of data in one central location and supporting school-wide planning and accountability efforts. They also point to ways that the system might be made more effective for educators: Carving out dedicated time for ARIS (and for data-driven discussion in general) and improving related training and professional development opportunities would be solid first steps. More training about ARIS's advanced analytic tools may be especially important, particularly for school-wide users who already have a handle on the system's basic functions. Finally, to make ARIS more useful for day-to-day instruction, the system's content must be enhanced. Teachers clearly need access to more real-time information—regular assessments of student work, more anecdotal information about students, and so forth.

Looking forward, to the next generation of school data systems that are currently in development in New York and around the country, the ARIS experience suggests a number of valuable lessons. Obviously, the data that a system is designed to house should align with its stated goals (as the ARIS data does for school-wide planning, if not for classroom instruction). In addition, developers should think carefully about the utility of advanced analytical and "community" functions, like ARIS Reports and Connect. At the very least, these functions need to be tested under real-world conditions, to ensure that they meet educators' needs and make sense in the context of their busy schedules. It is possible that a less top-down—more "crowd-sourced"—approach to the development of these tools would help make them more effective. Perhaps a basic platform could be built, upon which educators could develop "aps" that support their work.

While the first year of this study has painted a rich picture of ARIS use and educators' perceptions of the system, there are still a number of important questions about ARIS that need to be answered. First, if, as our findings indicate, ARIS is best suited as a tool for school-wide planning (as opposed to classroom instruction), what does this school-level usage look like? It would be helpful to examine in much more depth how administrators, inquiry team members and data specialists are using the system. Second, are there schools where ARIS *is* being used by teachers to guide classroom instruction? Our study shows that this is not the norm, but it is possible that some schools have figured out how to make ARIS more relevant for day-to-day instruction. If so, their practices deserve a closer look. Finally, of course, there is the question of whether ARIS use is associated with improved student achievement. In the second year of our study, we hope to examine year-to-year changes in ARIS use and whether those changes are related to changes in achievement—that is, did schools that increased their use of ARIS also see improved test scores?

Understanding where ARIS has met or exceeded expectations, and where it has fallen short—and building knowledge, more broadly, about how people use data in schools—will surely improve the design and rollout of future systems. This is vital if such systems are to achieve their potential and make a real difference for educators and students.

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Endnotes

[i] One of the few efforts to empirically examine the use of data tools for teachers is by Tyler 2011.

[ii] School progress reports assign schools numeric and letter grades, based on a combination of student performance levels and growth rates on state math and English language arts test scores, for elementary and middle schools, and based on credit accumulation, Regents test scores, and graduation rates for high schools. Progress report grades also incorporate student attendance rates and measures of the school learning environment from student, teacher, and parent surveys.

[iii] Cited in a demonstration version of ARIS provided by the DOE to the Research Alliance.

[iv] To learn more about how educational data use fits into the theoretical concept of knowledge management, see Wayman et al., 2009. For more on knowledge management and its role in supporting business intelligence, see Nonaka, 1991.

[v] The DOE provides all schools with periodic assessments, in part to help them predict performance on state summative assessments and to identify learning challenges before students take high-stakes tests. The periodic assessments are presented to schools as "no stakes" tests designed to help teachers monitor student progress and target interventions. As of the writing of this report, most schools administer the Acuity assessments by CTB McGraw Hill, though many offer other assessments.

[vi] The Office of the Public Advocate received another 88 surveys (about 6 percent), but they were discarded because they were incomplete.

[vii] The surveys were sent to a fixed number of schools randomly selected from each of the 32 districts in the city. For the principal survey sample they randomly selected 11 schools in each district and for the teacher survey 14 schools in each district (see Liu and Kim 2012, p. 23).

[viii] The main source of data for the study was an online teacher survey, with more than 2,400 teacher respondents. AIR also conducted focus groups with teachers and administrators from 11 elementary, middle, and high schools, as well as with senior achievement and technology integration facilitators—network-level staff that support the instructional needs of schools.

[ix] We used the DOE's summaries, as this process occurred prior to receiving the raw clickstream data from the DOE later in the year.

[x] We also compared ARIS usage levels among the 23 sample schools and the rest of the 227 middle schools, and found no notable differences. We tested the average amount of time ARIS was used in each school, as well as the percent of "heavy users" in each school, and we looked at the percent of teachers with school-wide access to the data in ARIS.

[xi] The research team also assigned the transcripts to two categories: "principals" and "teachers" to make it easier to view and analyze them.

[xii] These calculations are based on the Research Alliance's analysis of 2010-2011 human resources (HR) data obtained from the DOE, which found a total of 95,133 school-based staff who were actively employed in the New York City's public schools as of October 2010. This includes teachers, teacher's aides, administrators, community superintendents and administrative assistants.

[xiii] Since the focus of the study is on educator use of ARIS, we have excluded data from time spent on ARIS Parent Link.

[xiv] A much smaller group of users have access to aggregate-level data only.

[xv] Based on a total of 1,639 schools, as generated by a Research Alliance calculation using the DOE's Location, Generation and Management System (LCGMS) data from 2010-2011.

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The Research Alliance for New York City Schools conducts rigorous studies on topics that matter to the city's public schools. We strive to advance equity and excellence in education by providing non-partisan evidence about policies and practices that promote students' development and academic success.